MACHINE AND TOOL ENGINEERING

The TOOL ENGINEER

JULY, 1943

Official Publication of
American Society of Tool Engineers

STREAMLINING PRODUCTION ...a new feature
PAGE 75

Gaging Diameters with Air Pressure
PAGE 72

TRAINING Men and Women for TIME STUDY
PAGE 99

Are You Planning for POST-WAR?
PAGE 107

VICTORY COBALT

This new Class A High Speed Steel is the answer to the demand for increased cutting service on heat treated steels as well as cast iron.

Victory Cobalt serves the war effort by combining unusual cutting ability and long wear with the conservation of strategic alloys.

Vanadium-Alloys

STEEL CO. LATROBE, PA.

PUBLISHED BY THE BRAMSON PUBLISHING COMPANY

SWENSON went a thousand miles . . . to work for half an hour

A Short Story complete on this page

AXEL SWENSON* is a gnarled, sawed-off little Swede. He's been with Pratt & Whitney since he was a boy, and that was in the '80s.

P&W sent a jig borer out to the Red River engine plant awhile back; something had happened to it in transit, and the Martin men couldn't put it together right. They called P&W. It was a job for Axel Swenson.

A P&W jig borer, you know, is one of the things that make mass production possible. It's the world's most accurate machine tool. Its base holds the work in position; its upright column holds the tool. Theoretically, that column ought to be at right angles to the base . . . no more, no less. But of course, that's just theory.

Well, this jig borer at Martin was out of line by some three ten-thousandths of an inch per foot . . . much too big an error to suit either Pratt & Whitney or Martin. Axel was pushed into a plane and away he went, his tool bag under his arm.

Little Axel Swenson walked up to Martin's plush-lined offices and stated his business. They led him out to the machine and he went to work.

For fifteen minutes he just measured the job with instruments from his kit. Then "Hoist 'er oop," he told the man on the crane. The rope slings stretched; the column went up off the base. Axel reached over and scraped the base joint tenderly, slowly, in the place his "know how" told him to touch.

Five minutes later he stepped back. "Hokay," he told the crane man.

Martin men did the measuring this time. They turned to Axel with a gasp. "Only one ten-thousandth of an inch out!" Excited comment rose from the group like a cheer.

Axel was tucking his glasses back in his pocket and putting his tools away when a Martin man, a mischievous twinkle in his eye, stepped up. "Hey, Axel, aren't you going to take out that other tenth?"

Axel looked up slowly. That was asking a lot. That was like asking a man who had just walked across Niagara by tightrope to try it again on one foot. Axel didn't speak. He put his glasses on and got out his measuring tools.

Now the word spread through the Martin shop like wildfire. Axel Swenson is going to try to take out a tenth! In hushed silence, men gathered to watch the old Swede who was locking horns with the infinite.

He had his measurements now. "Oop," he told the crane man. Then he reached in and scraped the selected spot . . caressingly, gently as a mother her babe. He stepped back. "Hokay," he said. He picked up his tools and headed for the door.

He picked up his tools and headed for the door.

"Hey! Wait a minute!" the Martin man called after him. "You can't leave here yet!" They hadn't even had a chance to check it. Maybe the old Swede had put it back to three tenths out, or even worse.

Axel yielded . . . paused at the door.

A Martin man straightened up, faced the group, his eyes bulging. "On the nose!" he breathed. "On the nose! Not a flicker out!" They looked around for Axel . . but Axel was on his way to the airport. It didn't surprise *him*.

* * *

Craftsmen like Axel Swenson and tools like the P&W Jig Borer are responsible in important measure for the success of American war production. Their precision underlies every large-scale metalworking operation. If you need *basic accuracy for mass production* — now in war work, later in peace — call on Pratt & Whitney, *Division* Niles-Bement-Pond Co., West Hartford, Conn.

**All names except our own are fictitious; the story, however, is fact.*

PRATT & WHITNEY

MACHINE TOOLS ★ SMALL TOOLS ★ GAGES

WEST HARTFORD CONNECTICUT

Basic Accuracy for Mass Production

Prompt Delivery? Yes!
But with Strict
Adherence to Accuracy
on "STANDARD" *Seasoned*

PLUG GAGES

PROMPT DELIVERY

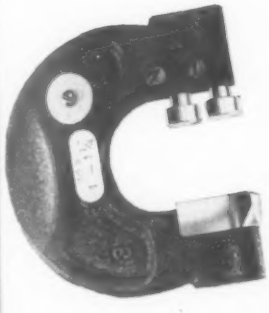
THE ACCURACY and economy of "STANDARD" Plug Gages is a byword and a "buy word" wherever precision parts are made. Even in today's constant clamor for SPEED, the material, craftsmanship and accuracy of "STANDARD" Gages are faithfully maintained.

Conserve Vital Gage Steel . . . Increase the Life of PLUG GAGES with Hard Chrome Plating

Salvage worn Plug and Ring Gages, save vital gage steel and conserve man and machine time with Hard Chrome Plating by STANDARD. Applied to new Gages as well as to Gages worn below original size, their life is increased 3 to 5 times.

STANDARD

Snap Gages



SNAP GAGES designed for ease in handling and speed in inspection. "STANDARD" Snap Gages are *standard* equipment for fast, precise war production. Constant analysis of materials and precision inspection at every stage of their manufacture insure the quality, stamina and accuracy of these *standard* "STANDARD" products.

SUPER *Snap Gages*

AN IMPROVED Snap Gage with spherical gaging pins that eliminate out-of-parallelism. Easily set, it requires no simultaneous adjustment to a given dimension and to parallelism. SUPER Snap Gage simplifies inspection, speeds production, insures greater accuracy and facilitates setting to closer tolerances. Write for special bulletin.

Complete Stocks Ready for Immediate Shipment

ARMY (E) NAVY

STANDARD GAGE CO., INC., *Poughkeepsie, N. Y.*

THE BETTER FASTENING METHOD

fibro forged SOCKET SCREWS by HOLO - KROME

Demands for design simplification — man hour savings — efficient use of materials — increased production — have been made possible in countless applications by the use of Holo-Krome FIBRO FORGED Socket Screws — the better fastening method.

It's the "Completely" Cold Forged method (patented and used solely by Holo-Krome) that gives these precision made Socket Screws the qualities to unfailingly perform under the unusual stress of war time requirements. Specify "HOLO-KROME."

YOU WANT IT — HOLO-KROME GIVES IT

Guaranteed Unfailing PERFORMANCE

WRITE FOR IT — CATALOG OF SOCKET SCREW STANDARDS

THE HOLO - KROME SCREW CORP. HARTFORD, CONN., U. S. A.

The TOOL ENGINEER

VOL. XII T.M. REG. U.S. PAT. OFF. No. 7

ROY T. BRAMSON
President

R. G. BRAMSON
Business Manager

J. M. KAMBERG
Circulation Manager

TECHNICAL FEATURES

Wood Pack Reamer Finishes Contour ...69
Precision Gaging with Air Pressure 72
New Feature—Streamlined Production..75
Tapping Airplane Struts. 83
Plant Layout 85
Screw Machine Progress 90
Production Data Sheet 97
The Crib 98
Need Help in Time Study? 99
Know-How on the Vertical Shaper 105

MEN, MATERIALS and MACHINES

Production Perspectives 67
Patterns for Survival 107
Machine Tools and Post-War 116
Industrial News Digest 121
"Greenie"—Cartoon Feature 121
Production Pix 130
Capital Communique 133
New Equipment 162
New Literature 186
Handy Andy Says 196
Army-Navy "E" Award Winners 198
ASTE Doings 202
Passing Parade 214
ASTE Meetings 224
Classified Advertising 224
ADVERTISERS' INDEX 226

ROY T. BRAMSON, Editor and Publisher
ANDREW E. RYLANDER, Technical Editor
Associate Editors: RALPH E. DAVIS, WALLACE A. SCOTTEN, LEONARD WESTRATE, JEROME S. WILFORD

Published the first Thursday of each month, by The Bramson Publishing Company. Advertising, Editorial and General offices at 2842 West Grand Boulevard, Detroit 2, Michigan. Telephone MAdison 4077. Acceptance under the Act of June 5, 1934, at St. Joseph, Michigan, authorized December 18, 1940. Printed in the U. S. of A. Copyright 1943 by The Bramson Publishing Company. Member: Controlled Circulation Audit, Inc.

The Publication of MACHINE and TOOL ENGINEERING

THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BOULEVARD, DETROIT 2, MICHIGAN

ADVERTISING OFFICES

Chicago 2, Illinois
Dwight H. Early
100 N. LaSalle St.
CENtral 2184

Detroit 2, Michigan
Thomas J. Orlando
2842 W. Grand Blvd.
MAdison 4077

Los Angeles, Calif.
Robert W. Walker
403 W. Eighth St.
VAndike 9348

New York 17, N. Y.
A. M. Wilcox
420 Lexington Ave.
Lexington 2-4816

Providence, R. I.
Herman T. Pierik
4 Weybosset St.
GAspee 1568

JULY, 1943

Publisher's Letter

AS this page goes to press, Jerry Wilford has just returned from another editorial trip. This time he spent nearly a week in St. Louis, visiting some of the nation's largest war plants to secure for our friends and readers, practicable, factual technical material.

Now to write it—to get the drawings—or to make printable reproductions from blue prints and sketches — to obtain the necessary photographs and important War Department or Navy clearance. You know, on this matter of censorship, a delicate balance must be struck between providing workable facts for you production engineers and not giving aid and comfort to the enemy.

But that's just one of the problems, of which there are always a full quota. And, tough or easy, we like our business of publishing a unique magazine for the greatest production geniuses in the world.

Jerry introduces a new feature section in this issue which he calls "Streamlined Production." Produce more war materiel with fewer men and machine hours, less material and in less time. It's well worth your reading—page 75.

•

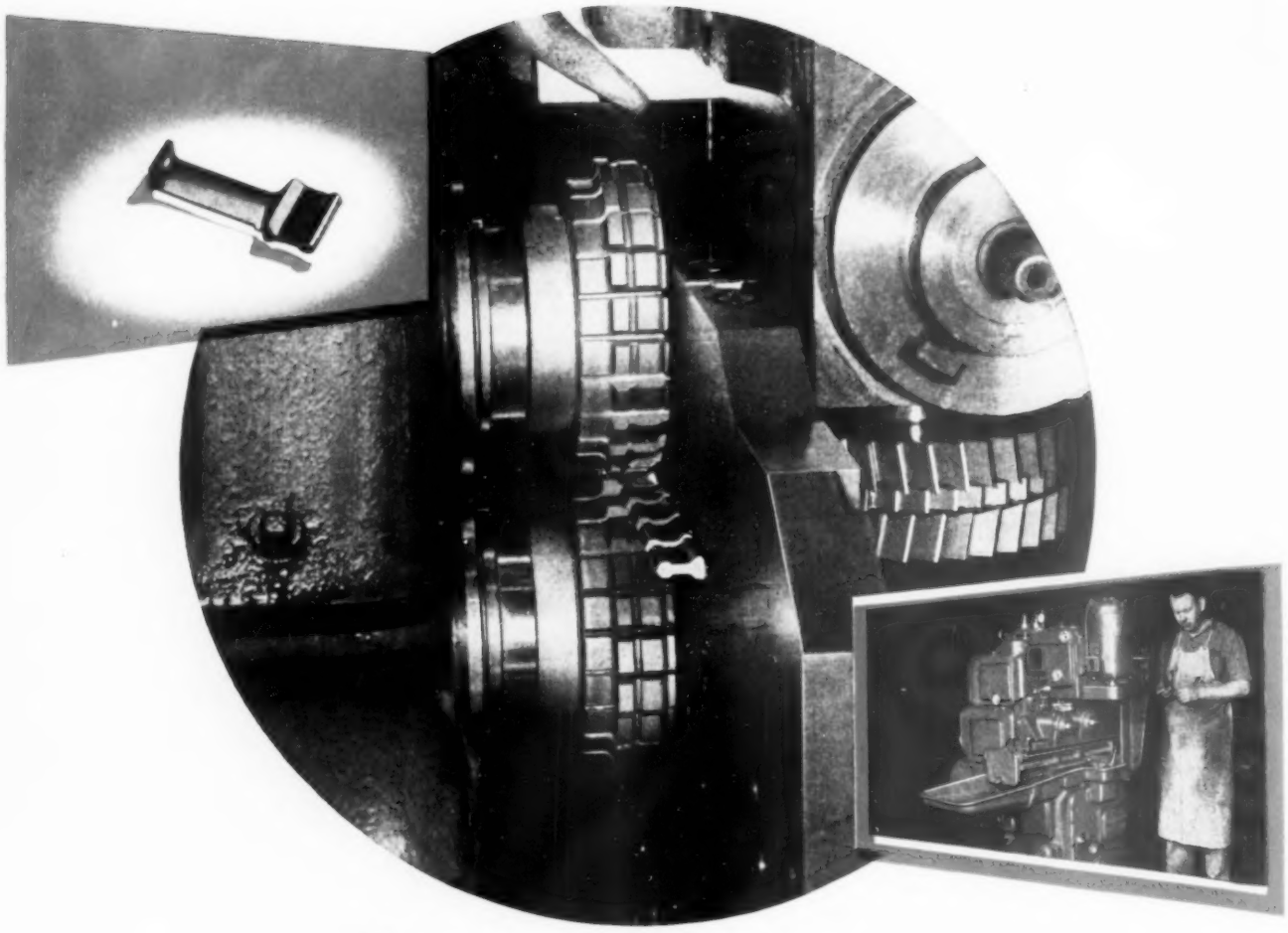
OTHER trips have taken us to Dayton, Cleveland, Toledo, Syracuse, Schenectady, Hartford and Chicago. We've seen some remarkable tooling adjustments being made toward even greater streamlining of production. And, that reminds me of Wally Scotten's story on Post War Planning. He has talked and corresponded with leaders of industry to develop his background for this article.

Wally never takes anything for granted. He has the type of engineering mind that must have every detail in proper alignment. See what I mean on page 107.

•

REALLY, I'm proud of this issue—we have lots of good material for any production engineer to sink his teeth into, the trouble is I haven't room in this little space to begin to tell you about all of it. But I'll name some of the articles for you—you be the judge. Machine Tools and Post War, written by Tell Berna—you'll find it highly interesting at this time, with all the current arguments—pro and con. In this issue also, first in a long time, all about a Southern production shop, on page 69. Screw machine progress, tapping airplane struts to a Class 3 fit, and plant layout, are featured.

Roy T. Bramson



Holding Form to .00025" *with* B-C UNGROUND FORMED CUTTERS

THIS piece for a vital part of war machinery is being successfully produced in large quantities with an *unusually fine finish.* Three milling operations in all are performed in finishing the tough steel forging. The second operation, shown above, consists of forming the radius and neck on one end of the piece and at the same time sizing to length and width on the other end. For the forming operation, two B-C UNGROUND Formed Milling Cutters are used, running on parallel spindles as shown. These cutters are large in diameter and have a large number of gashes to produce the fine finish which is essential and they hold the radius in relation to the neck *within .00025".* The sizing is accomplished by a combination of two B-C Half Side Milling Cutters and a Plain Milling Cutter, all ganged on a vertical spindle on the opposite side of the work holding clamp. These B-C cutters were *specially designed for this job* by experienced B-C small tool engineers and their outstanding performance is full testimony of our engineering department's ability to design Better Cutters. You, too, can profit from this engineering service by taking your cutter problems to your Barber-Colman representative, or by sending the data directly to us.

PRODUCTION DATA

Material — Tough Steel, Work Hardens.
Feed — 1 inch.
Cutter Speed — 46 R.P.M.
Stock Removal—Width .035 " Each Side. Depth 7/8" Each Side.
Machine — Sundstrand No. 1 Rigidmil. Three Spindle Head.
Holding Means — Special Fixtures.
Production — 59 pieces per hour, 1 machine.
Pieces per Cutter Sharpening — 2,000.
Production with former method — 80 per hour on two machines.

CUTTING TOOLS ARE SCARCE
MACHINES CAN'T RUN WITHOUT THEM
CONSERVE WHAT YOU HAVE

Buy War Bonds

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 213 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

Cutting oil *News* letter

Practical suggestions from the field on how cutting oils and coolants are being used by midwest machine operators to lick tough wartime jobs.

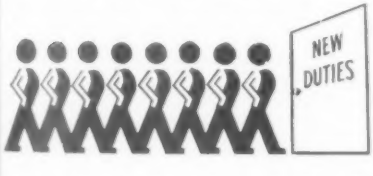
JULY, 1943

How longer tool life was obtained in making 250 lb. "practice" bombs

Operations by a stamping company on 250 lb. "practice type" bombs included drilling, reaming, tapping of the nose, cutting off tail end, and chasing an internal thread. Several oils failed to do the job right. Then the operator switched to Stanicool H. D. Soluble Oil (6 to 1 mixture); said it not only produced a better finish, but gave much longer tool life.

Bothered by Buildup on Dies? This was a real problem to a northwest manufacturer . . . on the male die on a deep draw job (6 in. deep) using 26 gauge steel sheets. Two parts Stanostamp "C" to one part water applied by swab ended this problem; also gave longer tool life at reduced cost.

Released 8 Men for Other Plant Work.



In producing 90 mm. anti-aircraft shells, a wrench manufacturer bumped into two headaches: (1) Use of high grade cutting oil at high surface speed and depth of cut caused excessive smoke, made parts too hot to handle. (2) Discoloration of the copper bands kept eight men busy buffing them. Working with plant operators, a Standard Lubrication Engineer selected a special soluble oil for this job. Last report was: perfect work coming through . . . no more rejects . . . the 8 men released for other work in the plant . . . ordnance inspectors enthusiastic.

Didn't ask for extra tool life but got it . . . as a bonus! The main idea in this plant was to lick the twin problems of 10% rejects and breaking along the edges when stamping radiator fins. Variation in hardness of material was the root of the trouble . . . which completely disappeared after changing over to Acme Base Oil Extra Heavy mixed 1 to 6 with paraffine oil. And to top it all off, a 40% increase in tool life has been secured.

How to Prevent Staining on Aluminum After Machining. Here's a practical suggestion that will interest many operators handling aluminum parts. In order to get away from staining and deposits on aluminum after machining, a battery and parts maker tried out a number of cutting oils. Final report is that Stanicut 62 FC was the only one to give full satisfaction. It is now standard for this operation.

OIL IS AMMUNITION . . . USE IT WISELY

World's Largest Planer Takes 6 Cuts At Once. A rolling mill and foundry company recently installed what was said to be the largest planer in the world. It has a table weighing 75 tons, carries a load of 300,000 lbs., takes six cuts at one time. Six barrels of Stanolex No. 31 were placed in the system for dependable lubrication.

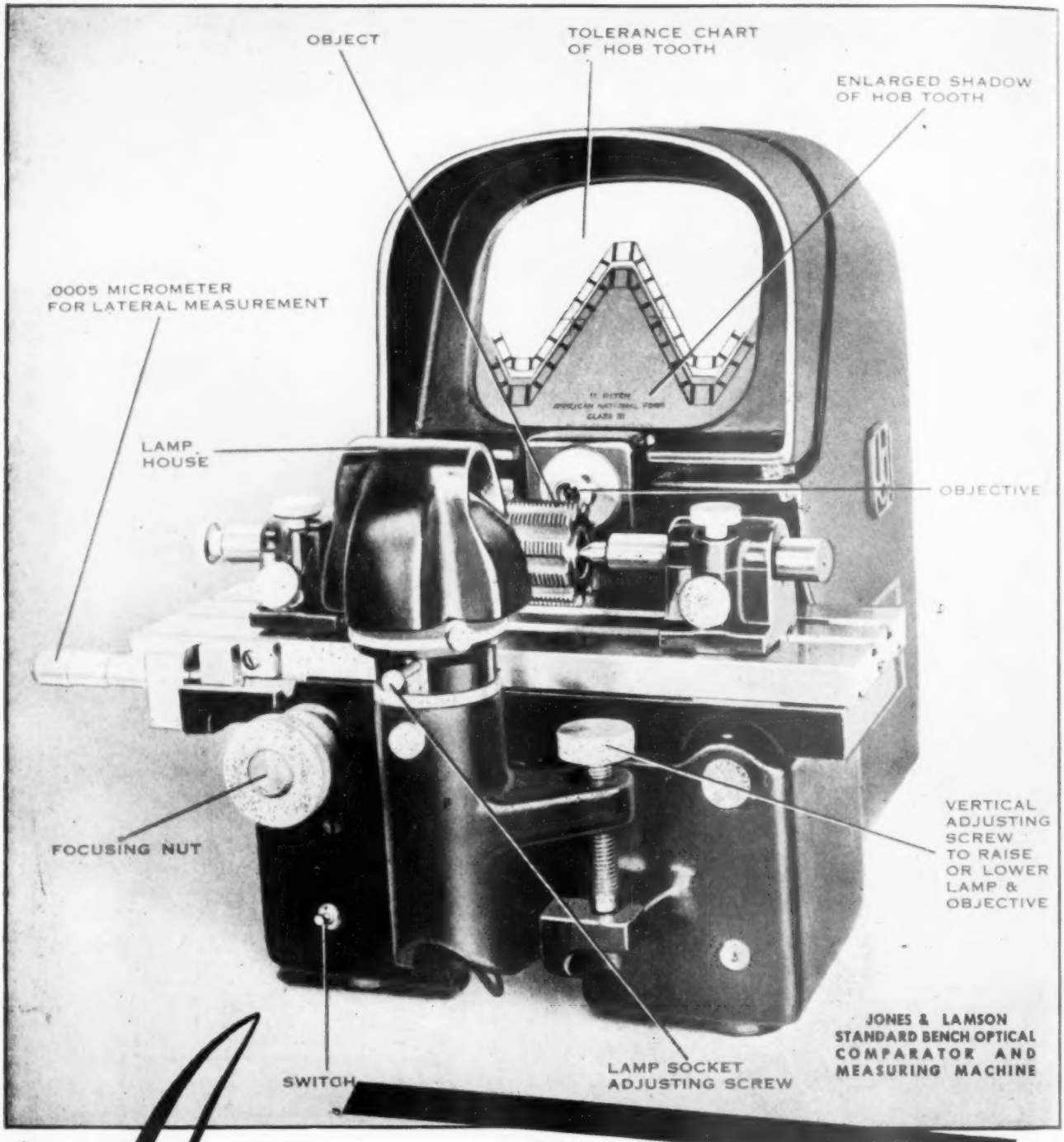
Army Inspectors Give Entire Approval. A farm machinery manufacturer, in recently converting to war production, found it difficult to secure approval of finish and cleanliness of parts for plating after machining and tapping SAE 4150 steel. They started using Premier Cutting Oil No. 110 about 5 months ago, and army inspectors have given entire approval on workmanship ever since. More ease in cleaning parts for plating with this oil was a plus advantage.

When You Bump Up Against Special Cutting Oil Problems

• If you are running into trouble in handling war work, and find it tough to get the necessary accuracy, finish, and tool life on converted machines . . . or if you have other perplexing machining jobs that a more efficient application of cutting oils may help answer . . . call in a Standard cutting oil specialist. Phone or write Standard Oil Company (Indiana) office, or 910 S. Michigan Ave., Chicago, Ill., for the Engineer nearest you. In Nebraska, contact any Standard Oil Company of Nebraska office.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATI


OBJECT
TOLERANCE CHART OF HOB TOOTH
ENLARGED SHADOW OF HOB TOOTH
0005 MICROMETER FOR LATERAL MEASUREMENT
LAMP HOUSE
OBJECTIVE
FOCUSING NUT
VERTICAL ADJUSTING SCREW TO RAISE OR LOWER LAMP & OBJECTIVE
SWITCH
LAMP SOCKET ADJUSTING SCREW
JONES & LAMSON STANDARD BENCH OPTICAL COMPARATOR AND MEASURING MACHINE

A complete, economical inspection system

For inspection and measurement in the toolroom or for comparison inspection of production parts with a master chart or template, the economy of inspection by Optical Projection with Jones & Lamson Comparators is beyond question.

Errors are immediately detected, thus they can readily be corrected, and the loss of much valuable time eliminated.

There is a Jones & Lamson Optical Comparator for every need in the field of inspection by Optical Projection, and our inspection engineers are ready to study your inspection problems and make recommendations based upon more than twenty years experience in this field.

JONES & LAMSON MACHINE COMPANY SPRINGFIELD, VERMONT

Manufacturers of: UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC THREAD GRINDERS • OPTICAL COMPARATORS • AUTOMATIC OPENING THREADING DIES.

J&L

PROFIT-PRODUCING MACHINE TOOLS

SEE MORE PRODUCTION

THROUGH CIRCLE "C" SUPER HIGH-SPEED STEEL

In shop after shop, **CIRCLE "C"** is helping to break earlier high-production records.

Today's grim war-demands have revealed hitherto unrecognized advantages in using this truly **"SUPER"** high-speed steel for machining the tough, hard, alloy steels that go into America's latest weapons and equipment for victorious warfare.

There are definite applications where **CIRCLE "C"** is yielding at least 25% faster machining speeds, as compared with ordinary high-speed steels—for example, in airplane-engine production.

The new bulletin (No. SL-2005) tells more.

Send for
BULLETIN SL-2005

ARMY E NAVY

Firth-Sterling
STEEL COMPANY

Also makers of "FIRTHITE" Tungsten-Titanium Carbides for steel cutting

Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA - CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES

How to reduce PRODUCTION INTERRUPTIONS caused by tools

Many busy war plants have found the answer to the problem of getting more production per machine by using the Carpenter Matched Set Method of tool steel selection. Because it provides a definite *system* for selecting the one steel that is best for each tool, this method helps to get tools that give longer *uninterrupted* production. Thousands of successful applications have proved that the Matched Set Method definitely helps to get more productive time from machines and tools.

Below are two actual production line examples of how the Carpenter Matched Set Method has helped others get increased output from present equipment.

If you are anxious to get better tool performance in *your* plant, the Carpenter Matched Set Method can help you. The two books below can help put it to work in your plant.

WANTED:— HIGHER PRODUCTION

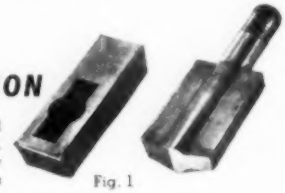


Fig. 1

JOB: Punching 3/16" thick O.H. steel sheets—19 punches and dies (Fig. 1) to the set-up. As this was a very *tough* job, the steel first tried was Carpenter's R.D.S. (Oil-Tough), toughest of the Oil-Hardening Matched Set. This gave 190,000 holes between grinds.

PROBLEM: To step up production per grind—so as to cut down shut-down time required for regrinding.

SOLUTION: Reference to the Matched Set Method indicated that greater wearing qualities could be obtained by moving north from R.D.S. to STENTOR (Oil-Hard).

RESULT: Punches and dies made from Stentor stepped up production *over 100%*—to 387,000 holes per grind. And here is an important point—while Stentor was chosen for its greater *hardness*, it also proved to have sufficient *toughness* to handle the job.

TWO JUMPS TO FIND THE ANSWER

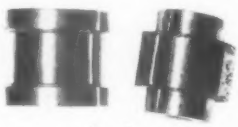


Fig. 2

JOB: Making 3" diameter rolls used for rolling a bead on stainless strip .008" thick. Note the thin edge on the bead.

PROBLEM: When made of carbon tool steel, the thin bead cracked in hardening, so the Matched Set Method was followed to STENTOR (Oil-Hard) for "greater hardening safety." When made of Stentor, the bead stayed on in hardening safe enough, but when placed in service the strain was too much for the thin section in this hard steel, and the edges chipped.

SOLUTION: Referring again to the Matched Set Method indicated that moving south to R.D.S. (Oil-Tough) would provide greater *toughness*.

RESULT: Made of R.D.S., the rolls shown in Fig. 2 had turned out "miles" of molding when this picture was taken—and the bead is still there!

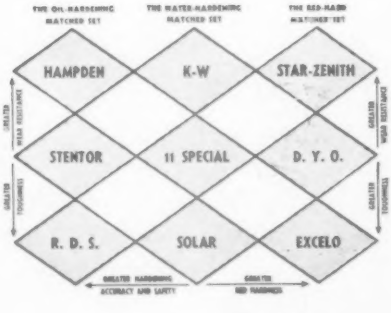
For "Refreshing" Skilled Tool Makers and Training New Men. More than 35,500 copies of this text book are now in use. Copies are available to tool steel users in the U.S.A. *at cost*, $1.00—$3.50 elsewhere.

For Tool Room Foremen and Tool Hardening. A 167-page manual with a comprehensive explanation of the Matched Set Method of Tool Steel Selection, detailed heat treating data, hardening instructions. *Free* to tool steel users in the U. S. A.

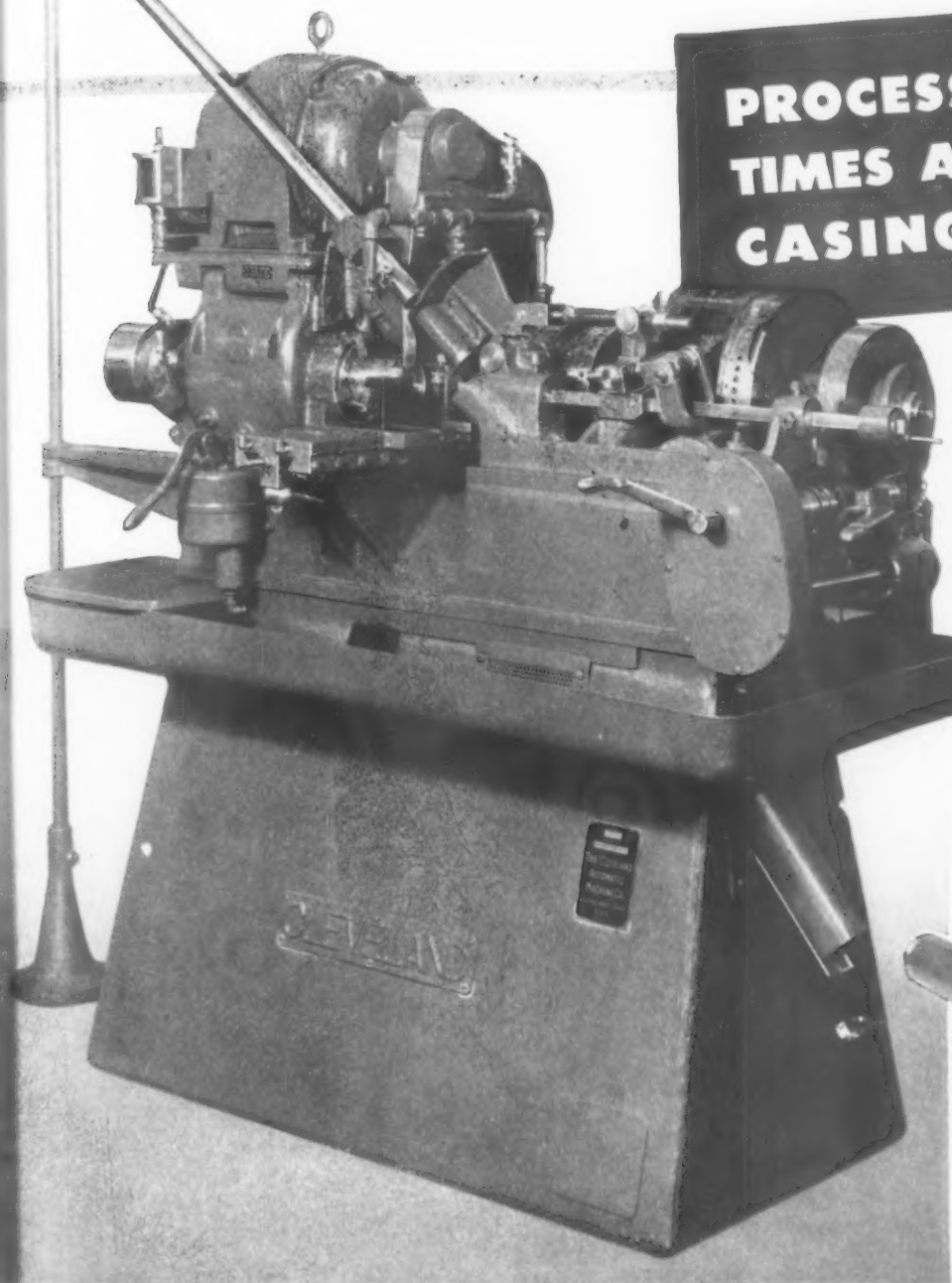
The Carpenter Steel Company 122 BERN ST., READING, PA.

Carpenter MATCHED TOOL STEELS

IMPORTANT BEFORE... **VITAL NOW**



CLEVELAND 20-37 MM, 50 CALIBER AUTOMATIC SHELL MACHINES



PROCESS UP TO FOUR TIMES AS MANY STEEL CASINGS PER HOUR

Complete head turning on 20 and 37 millimeter and 50 caliber steel shell cases is accomplished in a fully automatic operation on specially tooled Cleveland shell machines. The actual hourly rate of production is a military secret, but on runs already made the output has been as high as four times that of the old method of processing. By the use of Tungsten Carbide tools, steel casings are machined at a turning speed and production rate close to that of brass.

Not an experimental or hastily developed device, the Cleveland shell machine is made up from standard assemblies of the extremely simple, time-tested Model B Single Spindle Automatic, adapted with special tooling, loading magazine and transfer mechanisms. The result is a degree of dependability unusual in production equipment providing such a vast improvement in method and output.

Two models handle the complete range from 20 millimeter to 50 caliber steel casings. Shipped completely tooled for immediate production.

..REASONABLE DELIVERIES

THE CLEVELAND AUTOMATIC MACHINE COMPANY

CLEVELAND, OHIO

SALES OFFICES:

CHICAGO: 20 North Wacker Drive, Civic Opera Building, Room 1408
DETROIT: 540 New Center Building • CINCINNATI: 1315 American Building
NEWARK: 902 American Insurance Building

CLEVELAND *Single Spindle* AUTOMATICS

MODEL A—Built in 1 1/16-inch to 9 1/2-inch capacities
MODEL B—Built in 1 1/16-inch to 2 1/2-inch capacities

Announcing the Improved

MURCHEY

Collapsible Machine Tap
Type "BM"

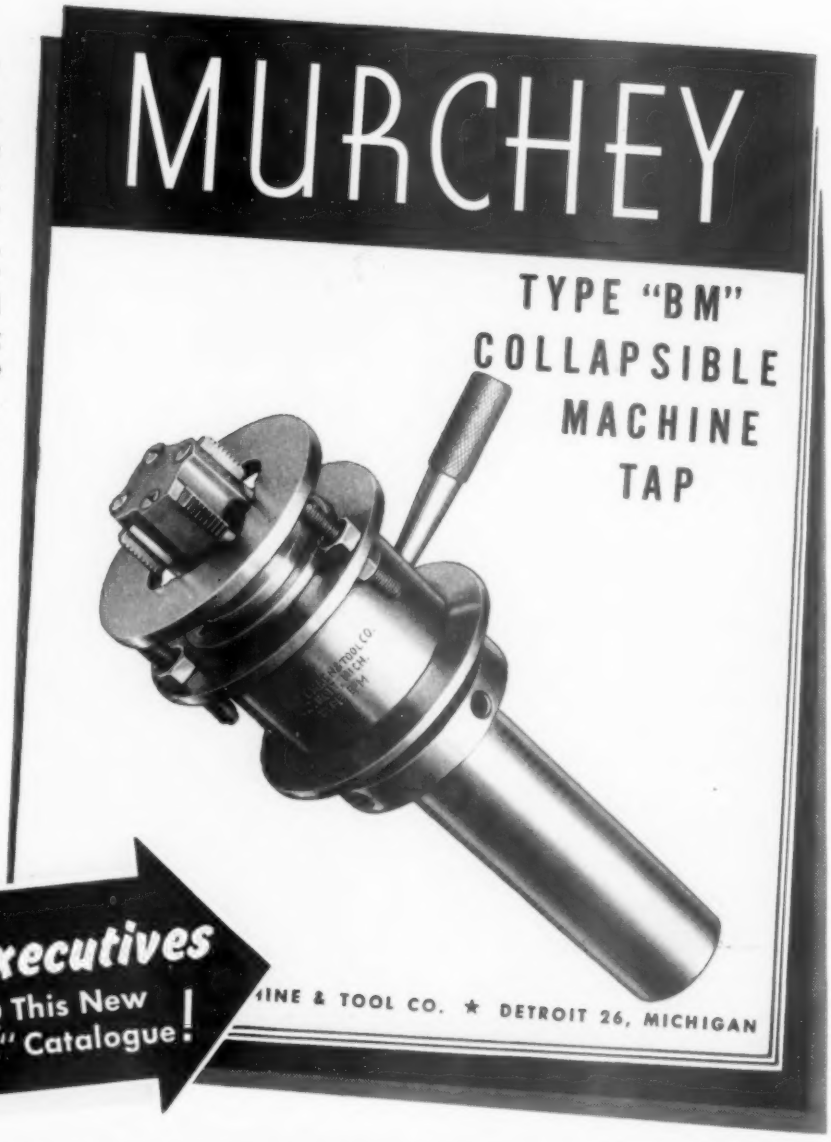
"For Threading to Extra Accuracy at Extra Speed"

4 WEEKS' DELIVERY

Sturdy—speedy—and entirely dependable. Always simple to operate—simple to adjust. Ready for quick conversion into either a rotating or stationary tool. With handle attached, Type "BM" provides a stationary or non-rotating tap on turret lathes and hand screw machines. By removing handle, it is ready as a rotating tap on drill presses or tapping machines. Its positive and quick operating action—a Murchey Engineering development—protects work, saves production time, increases machine capacity. Murchey tap collapsing mechanism insures instantaneous action. You get accuracy of thread length and you get thread protection in withdrawing tool from work.

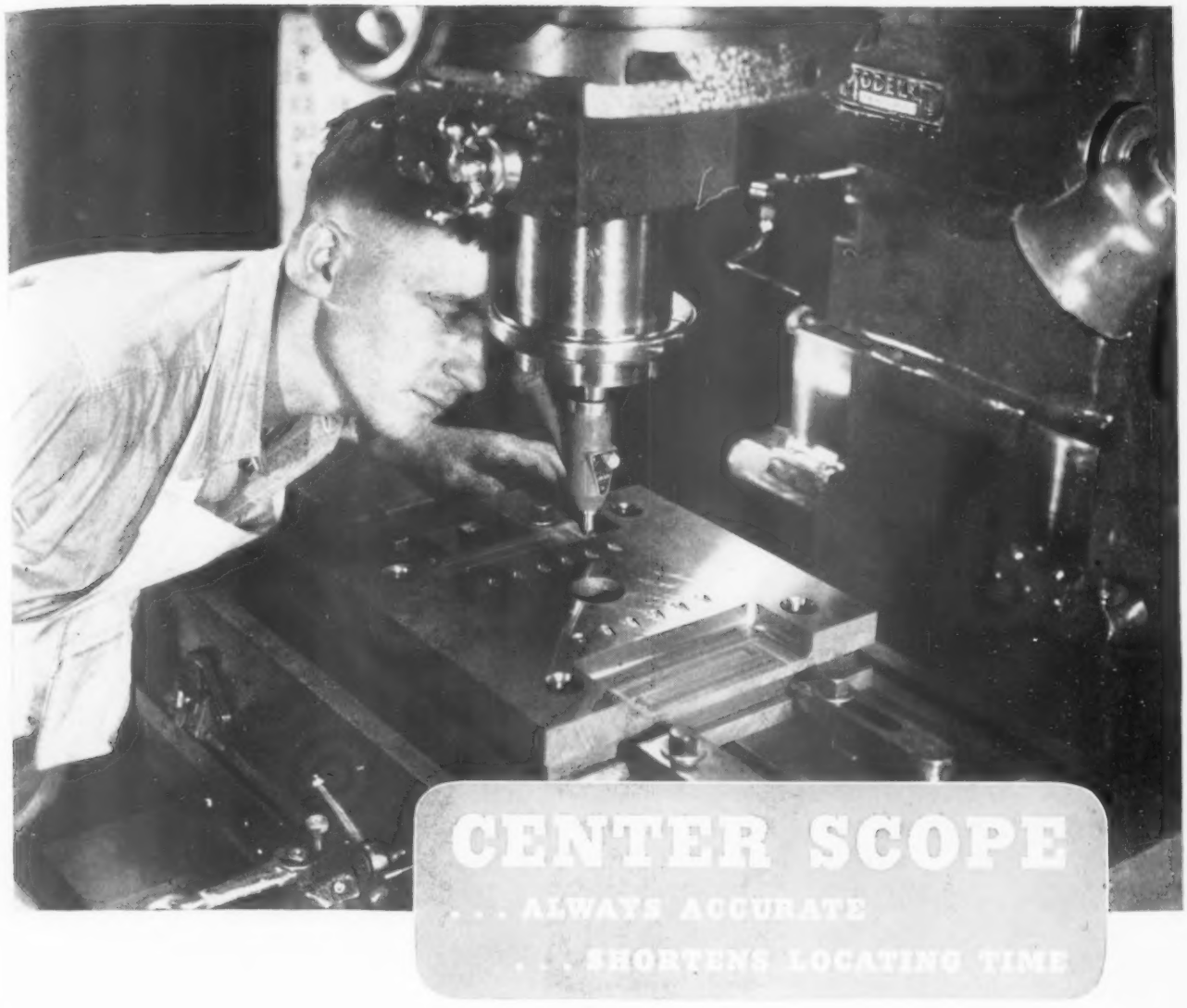
Write for your copy of illustrated, descriptive booklet on Type "BM". There's no obligation—write today. Address Dept. T

MURCHEY MACHINE & TOOL CO.
DETROIT 26, MICH.



Shop Executives
You NEED This New Type "BM" Catalogue!

MURCHEY



CENTER SCOPE

. . . ALWAYS ACCURATE

. . . SHORTENS LOCATING TIME

Better work at lower costs — is the universal report from shops using Center Scope, the optical locating tool. Job time estimates are being reduced, because Center Scope makes locating time shorter and gets more work out of each machine tool, from bench drill to lathe or jig borer.

Center Scope can be used without technical knowledge or training, and produces accuracy of plus or minus .0001" or better the first time an operator uses it.

Used on any machine tool, it is a precision instrument, not affected by wear, temperature, or mechanical pressure.

Center Scope has many major functions applied to general machine shop work and to special and individual jobs.

Prices are attractive, too. Variable Center Scope, only $97 f.o.b. Los Angeles; Edge Block, $23 additional. Other models slightly higher. For full information, write for Bulletin No. CS301.

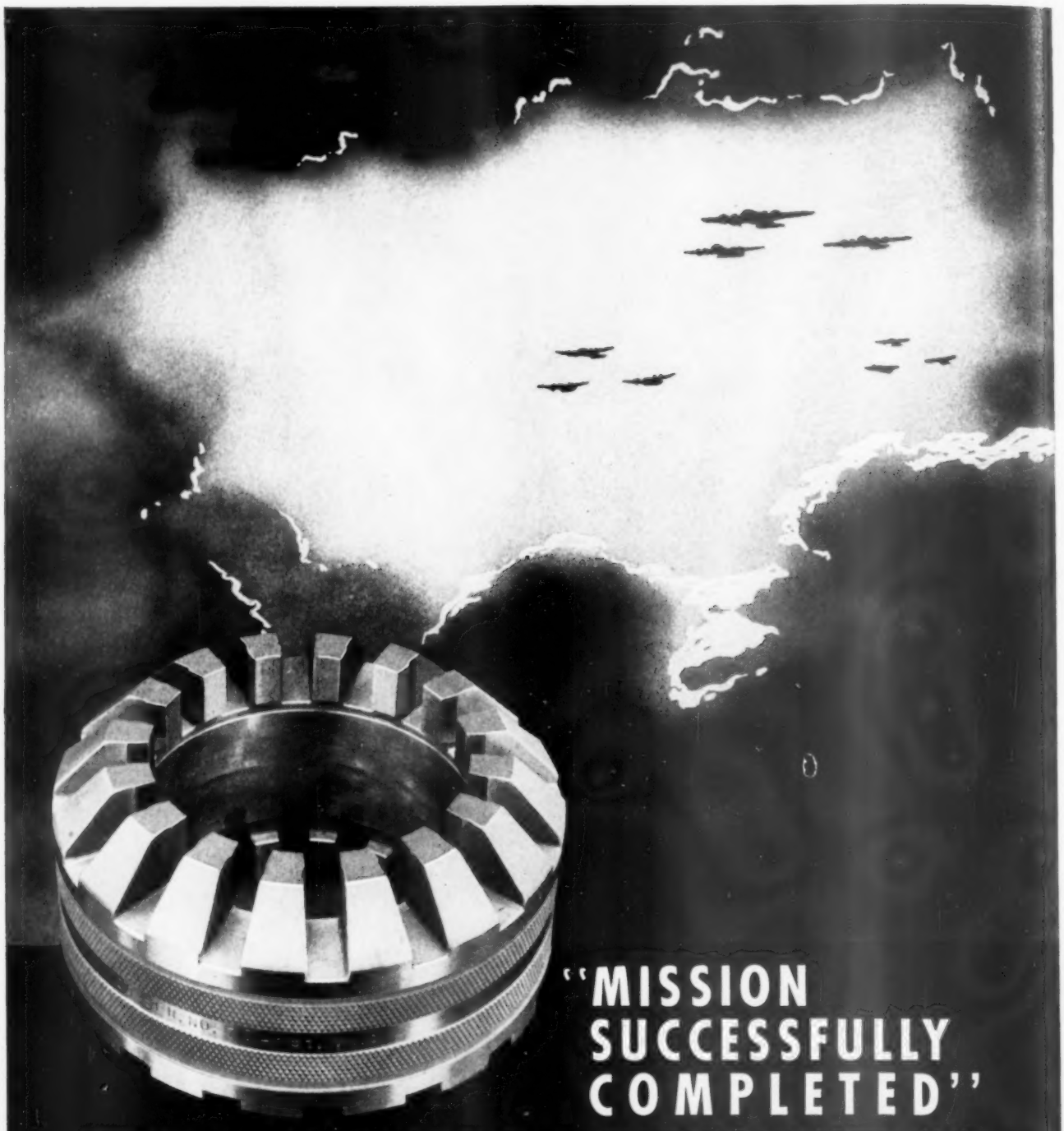
You've done your bit. Now do your best.

Buy a War Bond — TODAY

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker
Products
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill



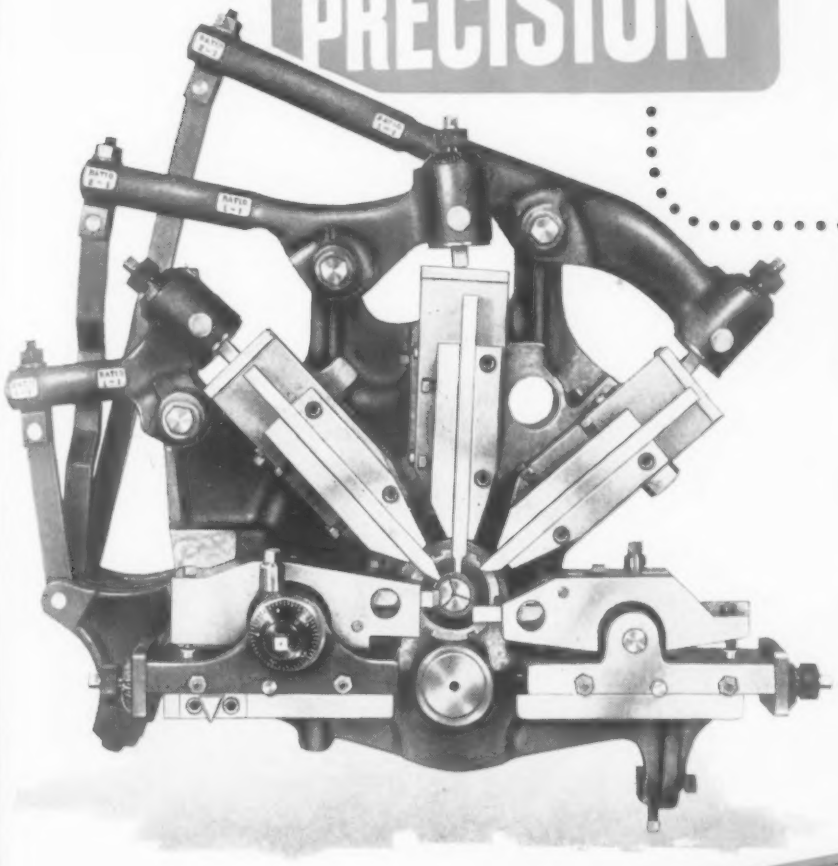
"MISSION SUCCESSFULLY COMPLETED"

Short, snappy hops to flatten submarine bases on the coast of Occupied France—block-busting visits to Essen and Cologne—softening operations on Bizerte and Tunis—cracks at Jap fields in New Guinea and Kiska—Shangri-la raids on Tokio—all of these use planes, planes and more planes! The almost 7000-plane-per-month production here in the U. S. would not be possible without those "production multipliers," those "precision inspectors"—GAGES. . . . VINCO is making thousands of gages for use in the rapid production of planes.

VINCO CORPORATION
8857 SCHAEFER HIGHWAY • DETROIT, MICHIGAN

MILLIONTHS OF AN INCH FOR SALE BY VINCO

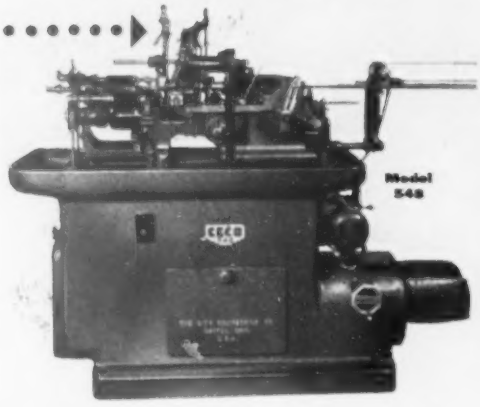
One-Operation PRECISION



CECO

SWISS TYPE *Automatic*

UNIVERSAL PRECISION SCREW MACHINES



Highlight Features!

BAR CAPACITY: 3/8" and 1/2"

4 or 5 RADIAL TOOL SLIDES.

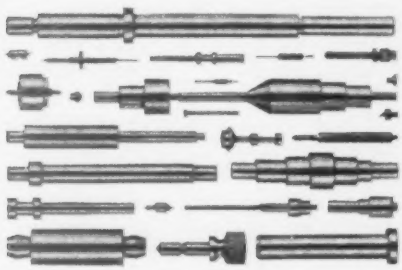
MAXIMUM TURNING LENGTH: 4" with flat cam.

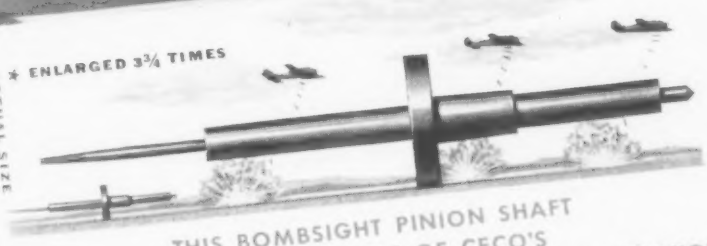
MASTER SPEED RANGER: Varies Spindle speed from 675 to 7500 R.P.M. at the turn of a handwheel.

PRECISION ROLLER BEARING SPINDLE: Always in adjustment.

CONSTANT RISE FEEDING MECHANISM gives extreme feeding accuracy.

Serving some of America's greatest precision-makers, including Norden, Kollsman, Sperry, Bendix and many others, the Ceco Automatic is revolutionizing the mass production of small intricate parts—cutting tool costs, speeding the set-up and producing *one-operation precision work* with amazing economy and efficiency.





THIS BOMBSIGHT PINION SHAFT
IS AN EXAMPLE OF CECO'S
ONE-OPERATION, HIGH-SPEED PRECISION PRODUCTION

Produced by Ceco *in one operation* instead of three formerly required, and with single tip tooling, thereby eliminating form tools commonly used, is the Bombsight part reproduced above.

Shown on this page are a few of the hundreds of parts Ceco produced in *one operation* with extreme accuracy and high finish. Odd shapes and multiple diameters, also complicated forms, including tapers, bevels, radii, etc., are Ceco-produced with single tip tools. Result—quick set-up, low cost, and faster high precision production of intricate parts. For information and literature write:

THE CITY ENGINEERING CO.
DAYTON, OHIO

Since 1909, Designers and Builders of Tools, Dies, Jigs, Fixtures, Gages and Special Machinery.

THE FOUNDATION FOR UNIFORM MEASUREMENT

DOALL Gage Blocks

Key to Mass Production

• In 1798 Eli Whitney went to Washington to demonstrate his idea of identical gun parts. Any part made in his shop was so accurate that it interchanged with the same part in any of his guns.

It was soon found, however, that his gun parts would not interchange with parts made by other gunsmiths, because no two shops had a common basis of precision measurements. For more than 100 years after that, there were no unndisputed measuring devices.

By 1913, Gage Blocks were accepted by industry as the foundation of uniform measurement. Interchangeability of parts for any machine or equipment became possible between plants, states and even countries. World War I was tooled up to 1/1000 of an inch; the needs of **this** war are accurate to 1/10,000 of an inch. When peace comes, these same accuracy requirements will carry over into mass production of civilian goods.

Metal working plants everywhere: Build Your Business onn Today's Gage Block Standards. Have sets of DoAll Gage Blocks in each department to provide the necessary accuracies for tomorrow's interchangeability.

LOW COST KEYS TO PROSPERITY

Working Set, 81 blocks, accurate to 8 millionths of an inch, is adequate for average manufacturing uses **$295.00**

Inspection Set, 81 blocks, accurate to 4 millionths of an inch recommended for tool room use and checking **$350.00**

Laboratory Set, 81 blocks, accurate to 2 millionths of an inch, for use in a room with temperature controlled at 68° F. **$1450.00**

Accessory Set, Laboratory instruments consisting of Master Surface Plate, Base Block, 4 sizes of Holders, Caliper Blocks, Center and Trammel Points, Vernier Gage, Master Squares and Parallels, Sine Bar with 3 straight edges, 2 Optical Flats and a Monochromatic Lamp. With this set you can build up snap gages and scores of setups for checking and inspection. In wood cabinet **$495.00**

FREE SOUND SLIDES—The DoAll man in your locality will gladly bring a portable projector to your plant and show a series of instructive slides on the Care and Use of Gage Blocks.

Write for interesting data about DoAll Gage Blocks.

SAVAGE TOOL COMPANY, Dept. TE, Savage, Minn.

DoAll Offices in 25 cities, each in charge of a trained engineer to give you quick service on DoAll Gage Blocks, Surface Grinders, Contour Machines, Band Saws and Files.

Ready Now to Speed Drilling
on WARTIME JOBS!

Thor

¼" HEAVY DUTY ELECTRIC DRILL with Housings of "THORITE" PLASTIC

Women operators, particularly, like the way the U14K handles. Reason: its weight has been cut 14%, its shape carefully designed for natural handling.

U14K weighs only 3-1/4 pounds, measures only 8-3/16 inches overall. Speeds: 2500, 3750 and 5000 R.P.M.

• When the new Thor "Armored in Plastic" portable electric ¼" drills go to work, wartime jobs are finished in a hurry! It's because these remarkable "plastic" drills develop more power per pound . . . weigh fully 14 per cent less . . . handle smoother with less effort . . . and have the extra stamina for around-the-clock operations. If yours is a war industry you can get these Thor "Armored in Plastic" drills *now!*

GET THIS HELPFUL DRILLING DATA

Thor circular No. JE-208 gives you full technical and performance information on the new "Armored in Plastic" electric drills. Write for it in the next mail.

ARMY (E) NAVY

THOR'S 50th YEAR

Thor *Portable Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO, ILL.

Branches in Principal Cities

Courtesy Bell Aircraft Corp.

Tips on finishing transparent plastics

THE aircraft manufacturing industries face special problems today in the finishing of transparent plastics. Therefore, an understanding of the abrasive products and methods of use best suited to their solution is important.

The picture above shows a process employed by Bell Aircraft Corporation using a Carborundum Brand Silicon Carbide cloth sleeve to finish the edges of enclosure sections for Airacobra cockpits. Abrasive discs, sleeves, belts and sheets are all widely used throughout the aircraft industry to meet the various finishing conditions encountered.

For best results in most edging operations, sanders should be operated at about 3,000 feet per minute. In general it is better to use a wet sanding process than a dry, in order to reduce heat, settle dust, eliminate loading of the abrasive surface, speed cutting and increase abrasive life. For surface finishing it is well to select as fine an abrasive as possible. One just fine enough to remove any scratches left by the previous operation is usually the right choice. This is a typical example of an operation employed on one of the newer materials of construction. In metal finishing operations, Aloxite Brand Aluminum Oxide in its various forms—discs, sleeves, belts and sheets—is used extensively.

Whatever may be your use of abrasives, we ask you to remember one thing: every abrasive tool is a "Weapon for Production"; it's important to use it wisely.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)

Why Ozalid clicks with engineers and draftsmen

STUDY THE cross-sectional drawing of an Ozalid Whiteprint Machine . . . It tells much of the story.

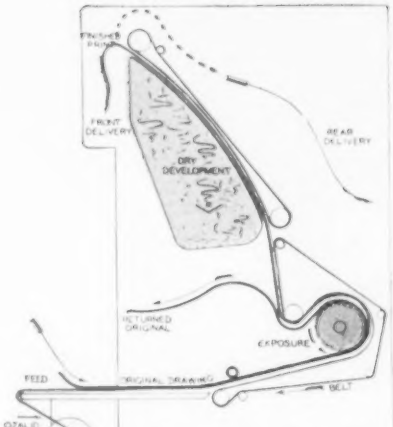
Printmaking is reduced to two operations—Exposure and Dry Development . . . the liquid baths, the plumbing connections, the driers which for fifty years have been a part of blueprinting *are eliminated.* SIMPLIFIED PRINTMAKING allows simplified design—and an Ozalid Machine is so compact that it may be installed right in the drafting room where it can be operated by anyone.

What's most important now, though, is the fact that the Ozalid Process saves thousands of man-hours . . . and that means a big "head start" in war production. When you want to change part of a drawing, it's never necessary to redraw any line which remains the same in the new design. You merely make a transparent print of the original tracing . . . delete the obsolete lines with a corrector fluid . . . and draw in the new design. It's that easy—no Van Dyke tieups, no photographic equipment required.

Ozalid Whiteprint Machines are designed for large scale, medium, and occasional print production. Adopt Ozalid . . . and make positive reproductions *direct* from *your* engineering drawings, charts, and letters.

WRITE FOR "SIMPLIFIED PRINTMAKING."

It shows how leading manufacturers save time, labor, and materials with the Ozalid Process; also contains samples of whiteprints having blue, black, and maroon lines on white backgrounds.



Cross section of Ozalid Model "B." For large scale production; top speed 20 feet per minute; front or rear print delivery; many new features.

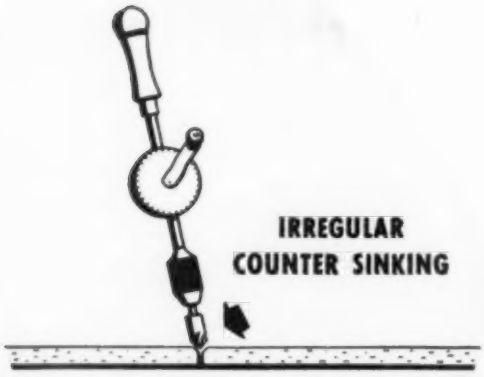
OZALID PRODUCTS DIVISION

GENERAL ANILINE AND FILM CORPORATION

Johnson City, N. Y.

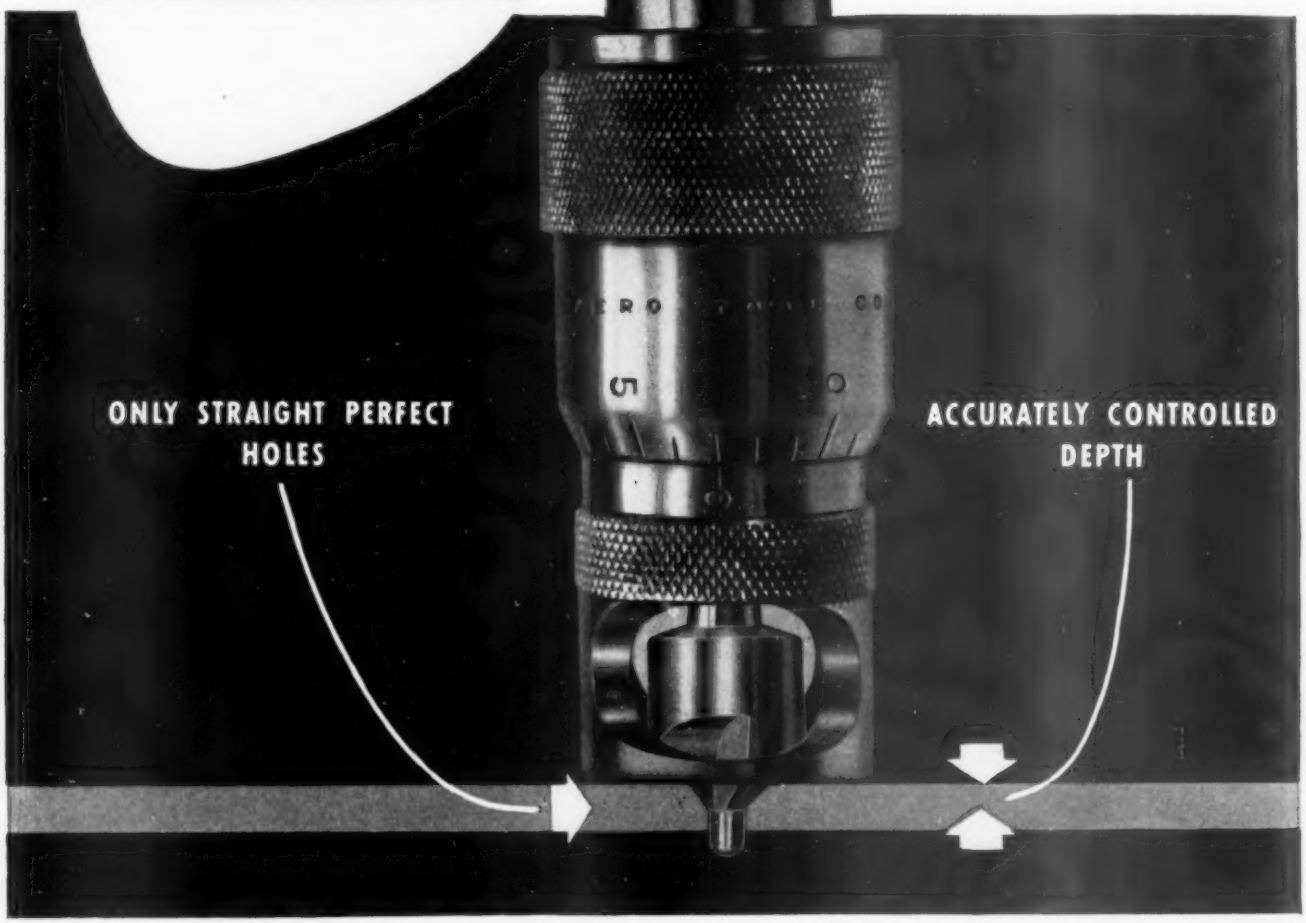
CHOPPING OUT SQUARE CIRCLES

with an egg beater?



Use of Stop Countersink is Essential —

1. **For close plus or minus tolerances of .002.**
2. **For speed...depth setting remains constant.**
3. **For efficient operation by semi-skilled labor.**
4. **For uniform concentricity of hole and machine countersink.**
5. **For minimizing danger of scratching material.**



A-T- STOP COUNTERSINKS — *STOP ERRORS*

Aero Tool <u>Micrometer</u> Stop Countersinks alone offer all these features: Increments of .001 with broached adjustment . . . locking, spring loaded, easily operated. ● Absolute concentricity of spindle, cutter and pilot assured by cutter inserts and seats on No. 00 stub taper. ● Concentricity within .001 of total indicator reading maintained by ground external spindle diameters and No. 00 internal taper. ● Longer life . . . no friction heat . . . through use of ball radial and oilite bronze thrust bearing. ● Split keeper gives positive set to retainer collar on bearings . . . a proven principle used in engine valve spring design. ● Cutters are cam ground . . . a special grinding process perfected for aluminum alloy materials.

AERO TOOL CO.

ENGINEERED AIRCRAFT TOOLS

231 WEST OLIVE AVENUE, BURBANK, CALIFORNIA • CABLE ADDRESS AERO

PRECISION *Thread Grinding*

. . . the modern method of producing accurate threads

Precision thread grinding has already become a vital step in the accelerated production of accurate threaded parts by American industry. Many manufacturers of parts for war material are grinding threads with Ex-Cell-O Precision Thread Grinders after the threaded parts are hardened, or grinding threads from the solid after heat treatment, because only by this method can they obtain uniformly, a high standard of accuracy in thread form, size, and finish. . . . With an Ex-Cell-O Precision Thread Grinder, you, too, can produce accurately ground threads on a profitable production basis. You can not only take advantage of today's great demand for precision threaded parts, but also provide for the future, when the precision grinding of all threaded parts in which accuracy is essential will undoubtedly be required.

EX-CELL-O CORPORATION • DETROIT

To the left: Ex-Cell-O Style 31 Precision Thread Grinder (this is one of nine styles of Ex-Cell-O precision thread grinding machines).

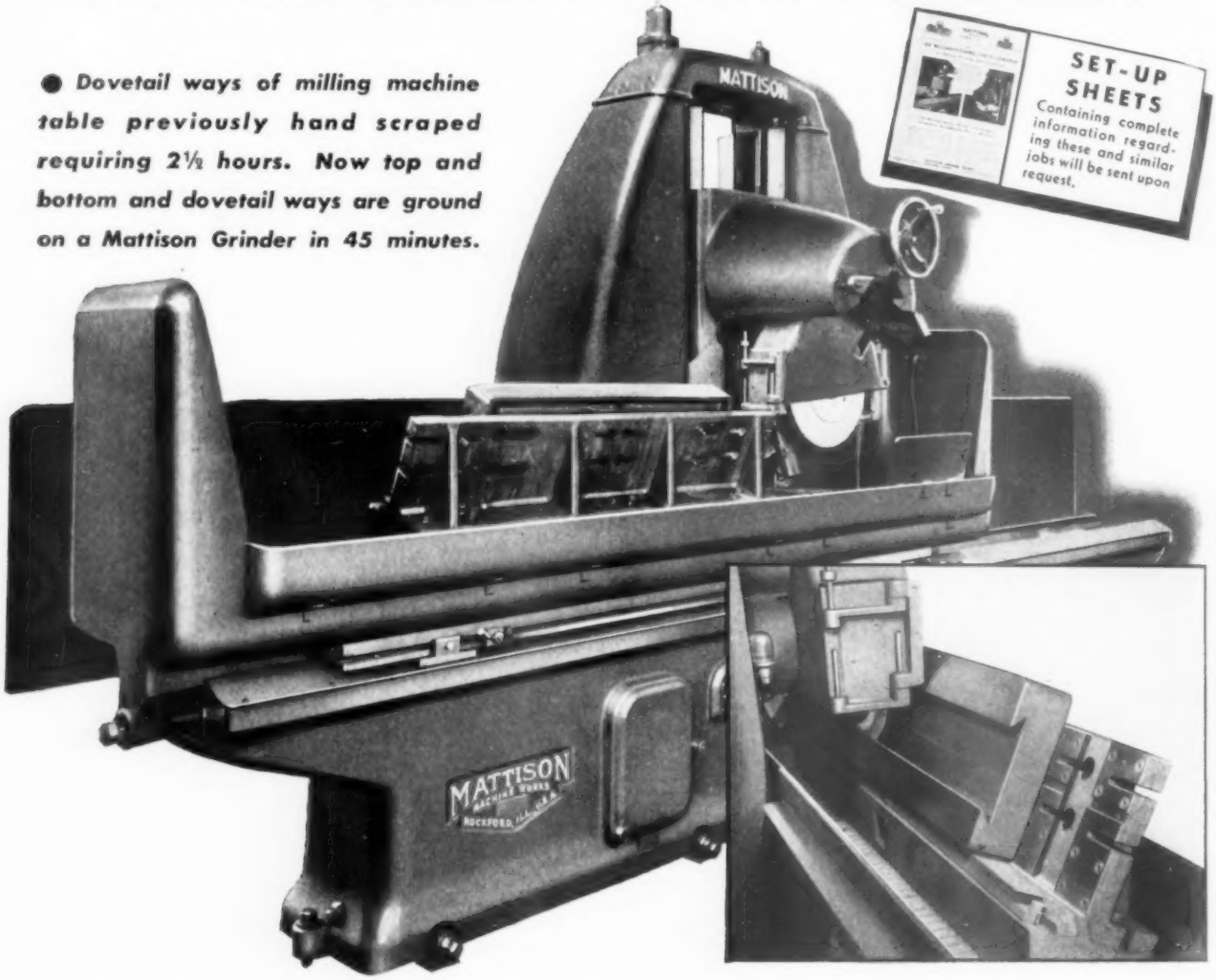
Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

XLO

EX-CELL-O *for* PRECISION

Dovetail Ways GROUND
ON MATTISON GRINDER IN 70% LESS TIME
THAN REQUIRED BY HAND SCRAPING!

● ***Dovetail ways of milling machine table previously hand scraped requiring 2½ hours. Now top and bottom and dovetail ways are ground on a Mattison Grinder in 45 minutes.***



SET-UP SHEETS
Containing complete information regarding these and similar jobs will be sent upon request.

● The illustration shows a Mattison High-Powered Precision Surface Grinder in the plant of Kent-Owens Machine Company grinding the dovetail ways of a milling machine table to precise accuracy and a very fine finish. An angle truing device permits truing both angles of wheel for grinding dovetail ways. The special holding fixture is used for holding table in position.

Previously it required 2½ hours to scrape the dovetail ways. Now, the Mattison Grinder not only grinds the dovetail ways, but the top and bottom of table, as well, in 45 minutes. The dovetail ways are ground to within .0003" of parallelism.

The above application is another example of how costs can be reduced through the use of a Mattison Grinder. It also shows the possibilities for grinding tables—slides saddles — heads — turrets, etc., having dovetail ways.

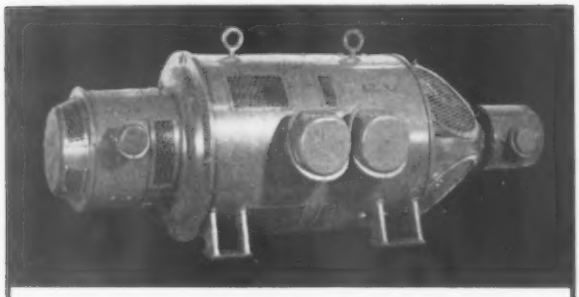
For those of you who have work of this kind, we suggest sending us drawings for an economical solution. If you would like free copies of our set-up sheets, showing other jobs of way grinding, drop us a line.

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

"36½% SAVED IN MACHINING TIME"

(increase varies with type and kind of job—may be more or less)

FOUR-IN-ONE unit. Induction motor, variable voltage generator, exciter generator and ROTOTROL are all compactly mounted on a single shaft. Separate cabinet houses simple control panel.



WHAT THE WESTINGHOUSE VARIABLE VOLTAGE PLANER DRIVE DOES

- Gives more *cutting strokes* per minute—gives faster acceleration and deceleration—*speeds reversing time*.
- *Reverses accurately to a line*—provides accurate control for planing up to shoulders or in blind pockets.
- *Provides constant speed* at any setting over entire range, regardless of voltage or load fluctuations.
- *Cuts machine outages* for control maintenance.

...using Rototrol and Westinghouse

VARIABLE VOLTAGE PLANER DRIVE

"36½% of the machining time formerly spent on this job has been saved by substituting Westinghouse Variable Voltage Drive for the conventional reversing motor."

This report from the owners of the above 48″ x 16′ Gray open-side planer is typical of the results obtained with this simpler, faster, more accurate control.

Thanks to Westinghouse ROTOTROL—the versatile control scheme that permits faster acceleration and deceleration—the Westinghouse Variable Voltage Drive can speed up the reversing action of the table, stop it at the precise same point every time, and give MORE cutting strokes per minute. Wider speed range (40 to 1200 planer motor rpm) permits use of the most efficient cutting and return speeds to fit the job.

Get the full details on this perfected and proved production booster! Ask your Westinghouse representative for B-3064. Westinghouse Electric & Manufacturing Co.

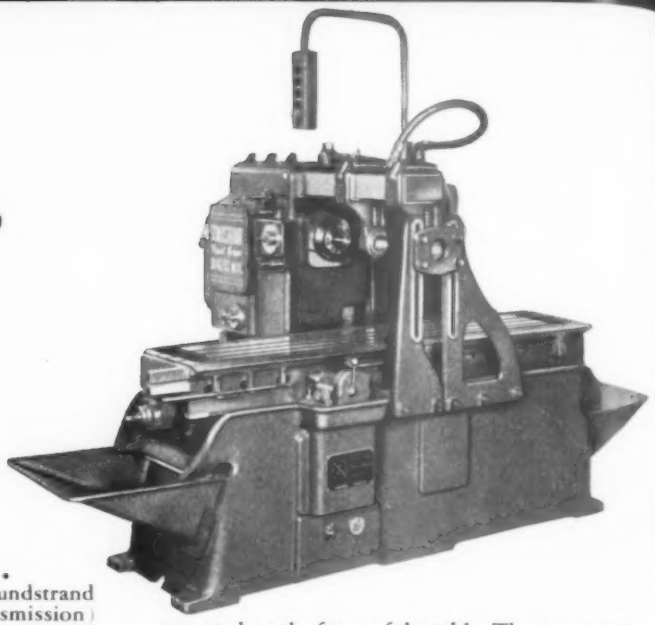
J-21202

Westinghouse VARIABLE VOLTAGE DRIVES

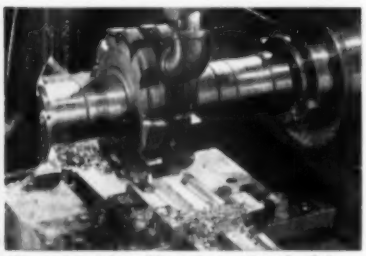
To Maintain Both Production and Finish While Taking Heavy Milling Cuts . . .

USE THE *fluid-screw* RIGIDMIL

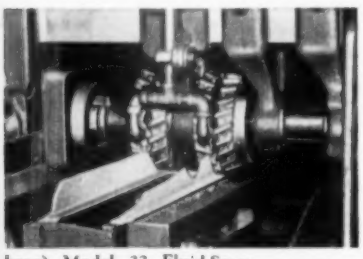
These Heavy Jobs Need the Accuracy of a Screw Feed PLUS the Flexibility of Hydraulic Control . . .



(Above) Climb milling motor bases on a Model 33 Fluid-Screw Rigidmil equipped with a special work-holding fixture.



Above) Model 33 Fluid-Screw Rigidmil form illing stepped grooves in guide rail parts.



bove) Model 33 Fluid-Screw gidmil climb milling 8 surfaces forged steel rib sections.

What the Fluid-Screw is . . .

The Fluid-Screw consists of a Sundstrand fluid motor (or hydraulic transmission) actuating a conventional table screw and nut. It offers the advantages of both hydraulic and mechanical feeding devices while eliminating their inherent disadvantages. This method of feed is incorporated in the Model 33 Fluid-Screw Rigidmil.

Its Advantages in Milling . . .

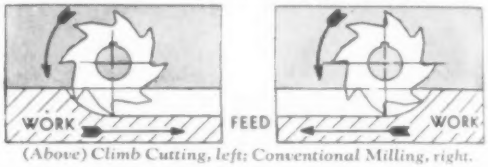
The positive feed makes it possible to perform either conventional or climb milling operations. Infinitely adjustable hydraulic feeds, together with a wide spindle speed range, permit adjustment to obtain the best cutting condition and maximum production.

Additional Features of the Model 33 Rigidmil . . .

The Model 33 Rigidmil is provided with a spindle speed range ratio of 30:1. It has a "double center drive gear" which provides two possible drive gear centers, and doubles the number of possible speed changes with each set of gears. Additional features of the Model 33 include automatic lubrication, rapid traverse rate of 300" per minute, separate feed and speed motors, square type table ways, precision bearing spindle and unit construction.

Wide Cycle Range for Both Conventional and Climb Milling . . .

Cycles are automatically controlled by dogs mounted on the front of the table. These are easily adjusted, and control table movements for a wide variety of cycles, including two-way cycles with skip feed in each direction, reverse from feed to feed, two feeds in each direction, and a different rate of feed (in one cycle) for each direction of the table. Dogs for 5 cycles are furnished as standard. Dogs and equipment for additional cycles also available.



(Above) Climb Cutting, left; Conventional Milling, right.

Use Sundstrand Engineered Production to Solve Your Milling Problems

In addition to the Model 33 Fluid-Screw Rigidmil, Sundstrand engineers have developed and designed a wide line of standard milling machines. These can be tooled to suit a wide variety of milling jobs. If standard machines cannot be tooled to suit your work, our engineers can design an economical special milling machine to increase production. They are at your service without obligation. Send complete, accurate information with each inquiry.

FREE DATA

This new 18-page booklet covers the features and specifications of the Sundstrand Model 33 Fluid-Screw Rigidmil. Write for your copy today. Ask for Bulletin 814.

Check **These Basic Specifications For Your Heavy Milling Jobs***

MACHINE SIZE	33-1448	33-1472	33-1848	33-1872
TABLE—Max. Travel	48"	72"	48"	72"
Working Surface of Table	14" x 78"	14" x 102"	18" x 78"	18" x 102"
Top of Table to C.L of Spindle	4½" min.—18" max.	4½" min.—18" max.	4½" min.—18" max.	4½" min.—18" max.
Feed Range	½" to 60" per min.	½" to 60" per min.	½" to 60" per min.	½" to 60" per min.
Rapid Traverse Rate	300" per min.	300" per min.	300" per min.	300" per min.
Spindle Nose	No. 50 N.M.T.B.A.	No. 50 N.M.T.B.A.	No. 50 N.M.T.B.A.	No. 50 N.M.T.B.A.
SPINDLE SPEEDS (by pick-off gears)				
Type "AA" Head	13 to 400 r.p.m.	13 to 400 r.p.m.	13 to 400 r.p.m.	13 to 400 r.p.m.
Type "A" Head	20 to 600 r.p.m.	20 to 600 r.p.m.	20 to 600 r.p.m.	20 to 600 r.p.m.
Type "B" Head	40 to 1200 r.p.m.	40 to 1200 r.p.m.	40 to 1200 r.p.m.	40 to 1200 r.p.m.
SPINDLE MOTOR				
Type "AA" Head	5 or 7½ h.p.	5 or 7½ h.p.	5 or 7½ h.p.	5 or 7½ h.p.
Type "A" or "B" Head	7½ or 10 h.p.	7½ or 10 h.p.	7½ or 10 h.p.	7½ or 10 h.p.

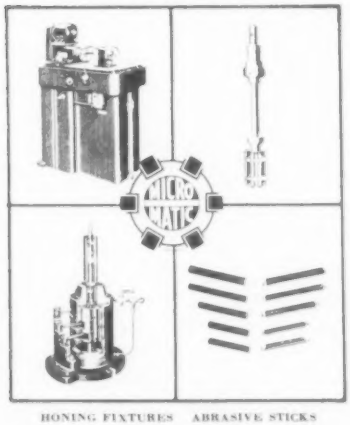
*Larger and special sizes also available.

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A. · ARMY E NAVY

SUNDSTRAND MACHINE TOOL CO.

2532 ELEVENTH ST. ROCKFORD, ILLINOIS, U.S.A.

Honing shared in converting yesterday's "PRIDE OF THE FLEET" into the MODERN ECONOMICAL TRUCK CARRIER



Yesterday—*Called "slave ships" and "kidney busters" by drivers, yesterday's trucks were hard to drive, costly to operate, and required almost constant service. But with all their crudities, they inaugurated a new era in highway transportation and distribution of goods. Grinding—an early process of controlled abrading—made them possible.*

Today—The powerful modern carrier has higher speed, maximum economy, long periods between overhauls, easy maintenance, a high pay-load factor—the goal of yesterday's builders. HONING, the modern, controlled abrading process, helped engineering design and production achieve this mechanical triumph.

Tomorrow—Today's tough military service and maintenance will be projected rapidly into commercial and industrial use. The competitive movement of bulk-weight shipments will require greater and greater operating efficiency.

In the mechanical refinements to come, HONE ABRADING processes developed by Micromatic will be ready to play a most important part.

MICROMATIC

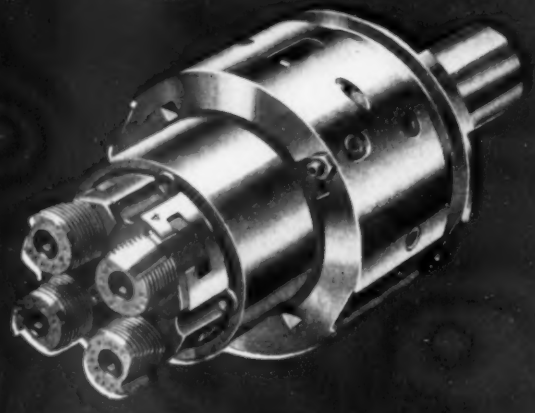
HONE CORPORATION

Detroit, Michigan

MAKERS OF HONING MACHINE TOOLS

2 Net Gains

PRECISION and TIME



There, in three words, is the essence of modern manufacturing.

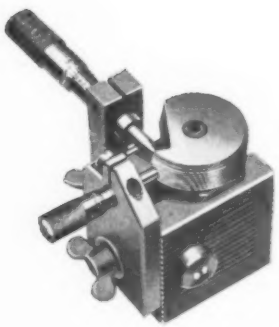
For tapping operations on 3″ to 5″ work, wherever extreme accuracy is required, Namco Collapsible Taps are setting new production standards.

← RSP COLLAPSIBLE CIRCULAR CHASER TAPS

. . . are applicable on both stationary and rotating spindle machines. They maintain accuracy over long runs, on tough alloys and stringy stock, and on close-to-shoulder work.

Circular Chasers are ground on blocks. In many plants a duplicate set is kept ready. When chasers become dull, the duplicate set is inserted in the head to cut identical threads—without readjustment. Production is resumed in two minutes, without spoilage of costly parts.

For extreme accuracy, on 3″ to 5″ work, ask us about RSP. Catalog D-42 will give you full details and specifications.



NAMCO MICROMETER GAUGE

. . . determines correct amount of Circular Chaser grind, and checks precision after grinding. Chasers may be ground through 270° of circumference—*they last 10 to 30 times longer.*

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

Important!

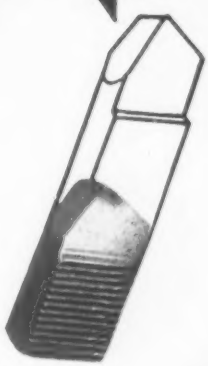
NO BLADE USED IN A LOVEJOY TYPE "A" MILLING CUTTER SHOULD BE DISCARDED UNTIL 50% (OR MORE) HAS BEEN USED!

High Speed Steel and other cutting alloys are scarce. That is why we urge you now, as always, to take full advantage of Lovejoy's exclusive *Positive-Locking* device for holding the blades in Lovejoy Type "A" Milling Cutters.

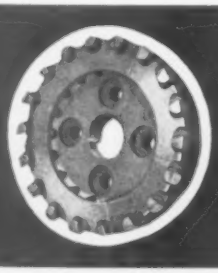
This feature is your assurance that over 50% of Lovejoy blades may be used before they must be scrapped — also your assurance that short blades are held as rigidly as new blades.

When your blades have been used to the limit, sell them to your scrap dealer, then order new blades out of our stock.

Worn out Cemented Carbide blades may often be salvaged by using Lovejoy's retipping service — information on request.



No Lovejoy blades should be scrapped until they are worn to this length.



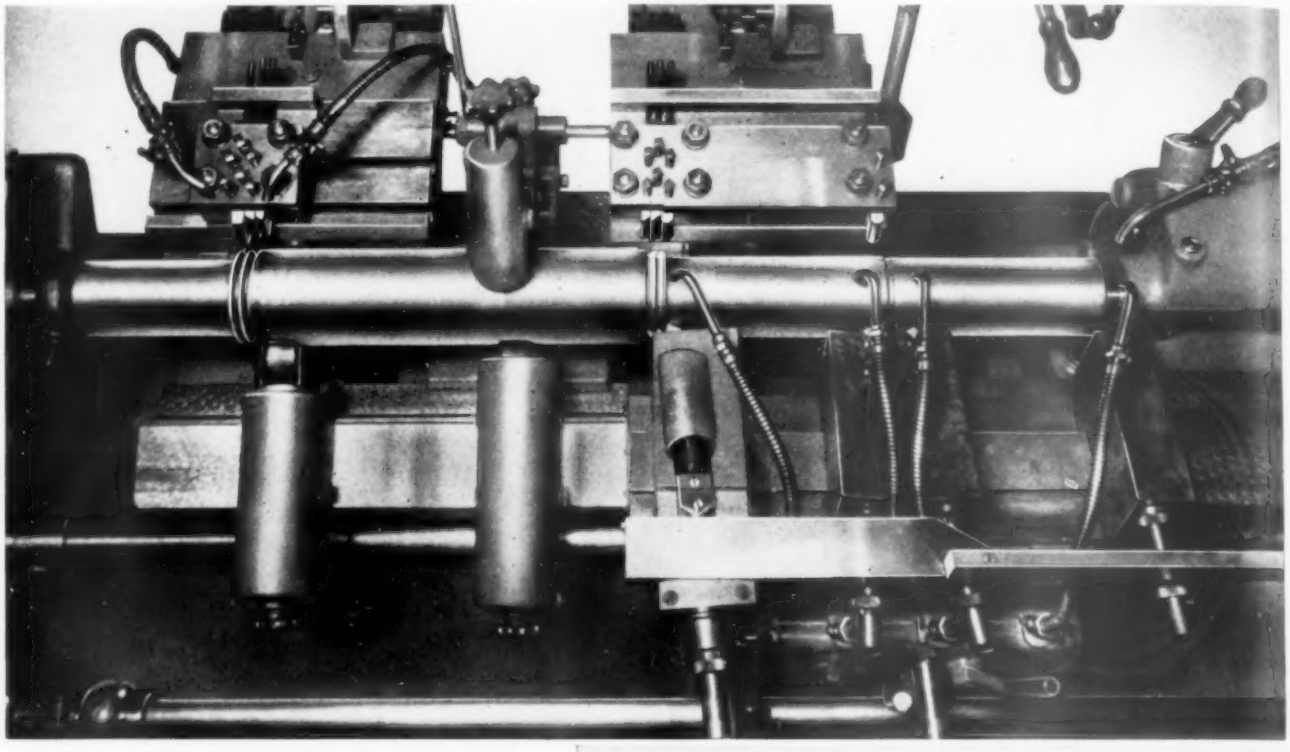
LOVEJOY

TOOL COMPANY, INC.

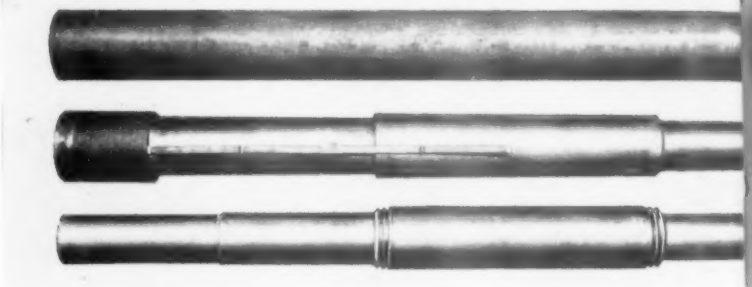
Springfield, Vermont, U. S. A.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



SHAFT TURNING COSTS REDUCED ON SHORT & MEDIUM LOT PRODUCTION



Problem: To reduce the cost of turning heavy electric motor shafts on small and medium lot production.

Solution: An 8" *Lo-swing* Lathe was selected for this job due to the simplicity of standardized tooling which may be readily changed for different diameters and shoulder lengths, thus minimizing the time required for changing over from one type of motor shaft to another.

The motor shafts are machined in two operations, both of which are shown in the small illustration. The first operation consists of rough turning the shaft to grinding size over practically its full length. The second operation completes the turning of the pulley end, the facing of the shoulders and the cutting of the oil slinger grooves. Tooling used for this latter operation is shown in main illustration.

The broad experience of Seneca Falls engineers is available to assist you with *your* turning problems. Catalog No. HLB42 provides information on the Seneca Falls *Lo-swing* line. Write for a copy.

LATHE NEWS from SENECA FALLS

Tooth Section of Van Normanized Gear

Material	plain carbon steel
Hardened to	55-57 Rockwell C
Depth hardened	.035—.045
Heating time	15 Sec.
Quenching	8 Sec.

Total time for heating operation 23 Sec.

Gear Teeth Surface Hardened in 23 Seconds

with Van Norman Induction Heating

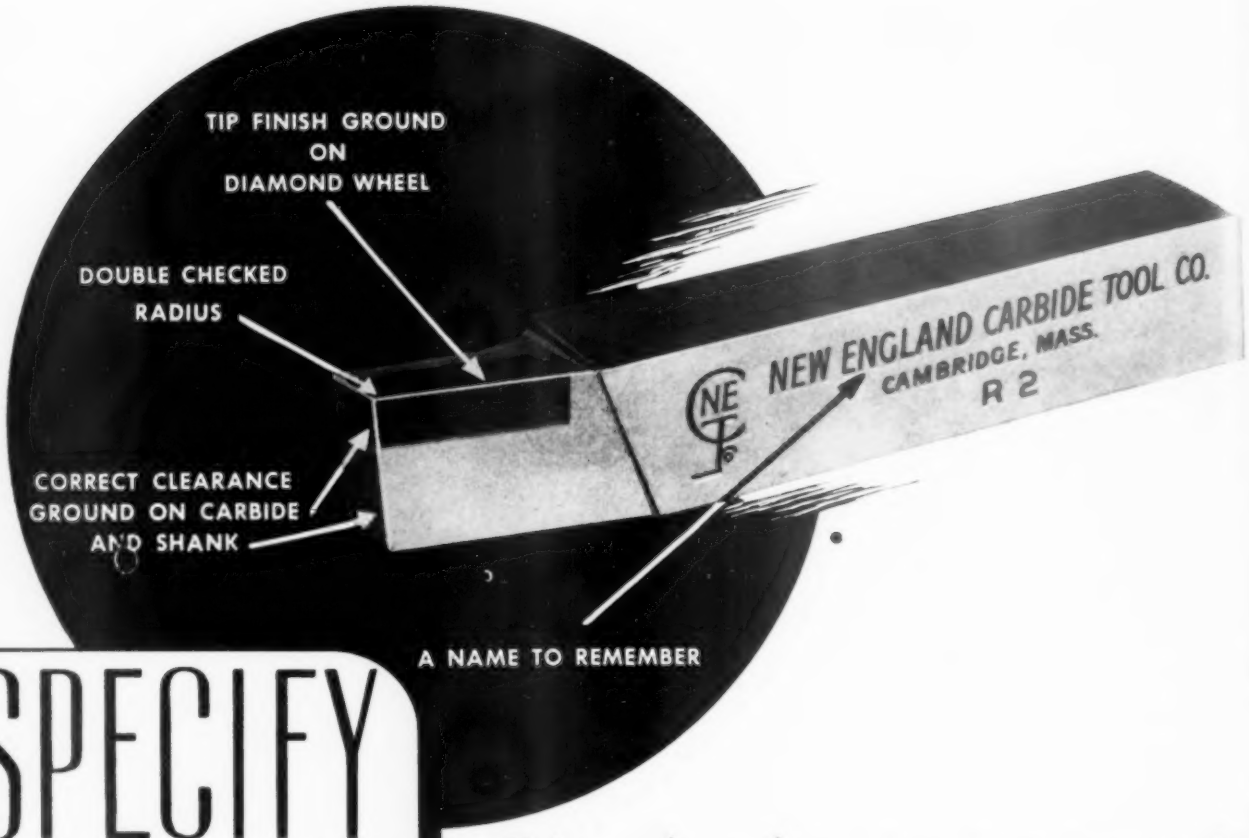
Previously, carburizing required hours to harden, draw, clean and lap the gear illustrated above. Now Van Norman Induction Heating hardens the teeth of the same gear to 55-57 Rockwell C in just 23 seconds. Warping and distortion are eliminated and no cleaning operations are necessary. Furthermore, since the operating cycle is entirely automatic, gear after gear is turned out with *identical* characteristics.

Obviously, *Van Normanizing* saves valuable work-hours, cuts costs and provides a hardened gear with superior performance qualities. Investigate the possibilities of Van Norman Induction Heating Units. Write for Bulletin M15.

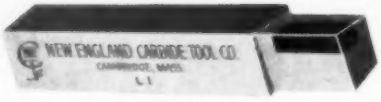
Van Norman Machine Tool Co.

SPRINGFIELD, MASSACHUSETTS

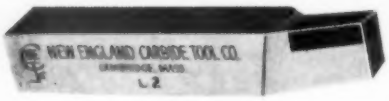
IT PAYS TO VAN NORMANIZE



SPECIFY
NEW ENGLAND *Standard* CARBIDE TOOLS



Tool Style No. 1



Tool Style No. 2

Tool Style No. 3

Tool Style No. 4

Tool Style No. X5

Tool Style No. X6

Styles 1 to 4 furnished right- or left-hand

New England *Standard* Carbide Tools are precision built—every tool is ready for the job, because correct radii and clearances are finish ground to correct tolerances. *Standard* tools are supplied with "U" grade tips for cutting aluminum, cast iron, brass, bronze and non-metallics, and in "S" grade for steel.

We will be pleased to arrange delivery schedules to produce your standard or special tools with any make or grade of carbide specified by you.

NEW ENGLAND CARBIDE TOOL CO.

60 Brookline Street • Cambridge, Massachusetts

TUNGSTEN CARBIDE PRODUCTS • DIAMOND TOOLS • DIAMOND POWDER

Please send me your new Standard tool folder and a Standard tool wall chart for our tool room.

NAME_____ TITLE_____

COMPANY_____

STREET_____

T. E. CITY_____ STATE_____

For quickest deliveries of the supplies you need

Dial the ◇ I S D ◇ *First!*

Your ◇ Industrial Supply Distributor is alert to your needs and interests, every hour of the day.

He knows the many kinds of materials you must have to keep going. He tries to keep you supplied from his many available sources.

He buys on priority—he buys as often as he can—he buys as much as he can get—to cover you and his other customers. Sometimes he doesn't even notify you until the goods are in, or on the way.

Think of your Industrial Supply Distributor as your No. 1 Source. Check with him before you run short. Make it standard practice to telephone your Industrial Supply Distributor *first.*

Know him? *Of course* we do—hundreds of "him" in big and little Industrial Cities all over America have distributed Cle-Forge High-Speed Drills and Peerless High-Speed Reamers for years and years—to *their* satisfaction, and *ours!*

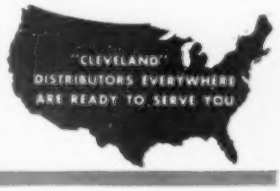
◇C◇

ARMY NAVY — ARMY E NAVY

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD., DETROIT · LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST., E.C.4



THIS "BOMBARDIER" HITS THE TARGET *EVERY* 49 SECONDS

At Wheeling Steel Corp., batteries of TOCCO machines are really putting the heat on the Axis—heating the ends of pipe to 2100° F. for the spinning of bombs.

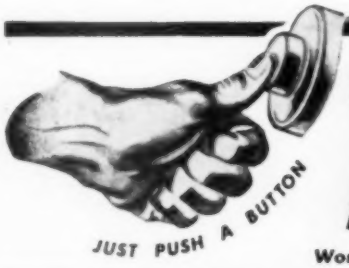
One operator, manning two TOCCO machines, each with two inductors, heats tail ends of these "500-pounders" and feeds one to the spinner every 49 seconds.

The heated area of every bomb is uniform. TOCCO's automatic timing assures accurate temperature for uniform forming results.

Yes, it's a fast pace, but the "bombardier" maintains it easily. The push of a button starts each TOCCO station. His "bomb bay" between the four stations of the 7′ wide TOCCO machines is compact. His working conditions are safe and free of fire, heat and fumes.

Just as TOCCO is blasting the Axis in this and hundreds of other war factories, so will it crack wide open many of your tough problems in post-war planning. Find out how these dependable, rugged induction heat-treating machines will cut your costs and improve your products.

THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio

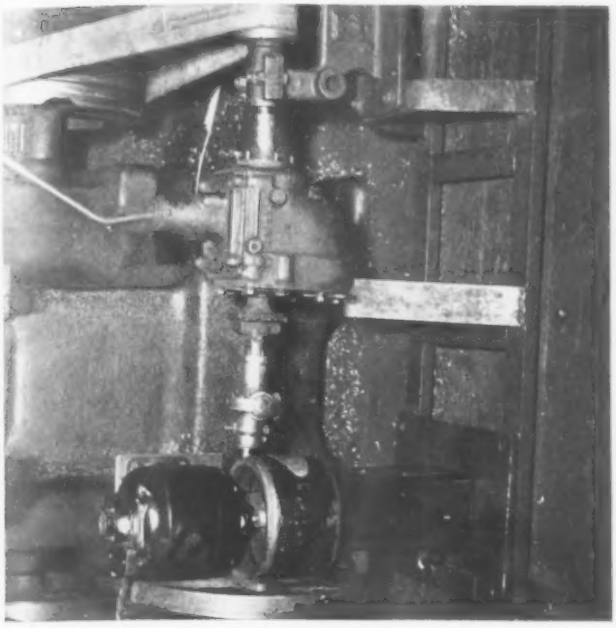


TOCCO

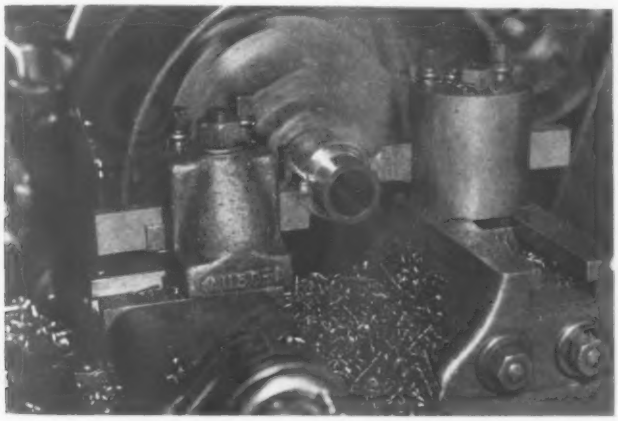
World's Fastest, Most Accurate Heat-Treating Process

HARDENING
ANNEALING
BRAZING
HEATING for
forming and forging

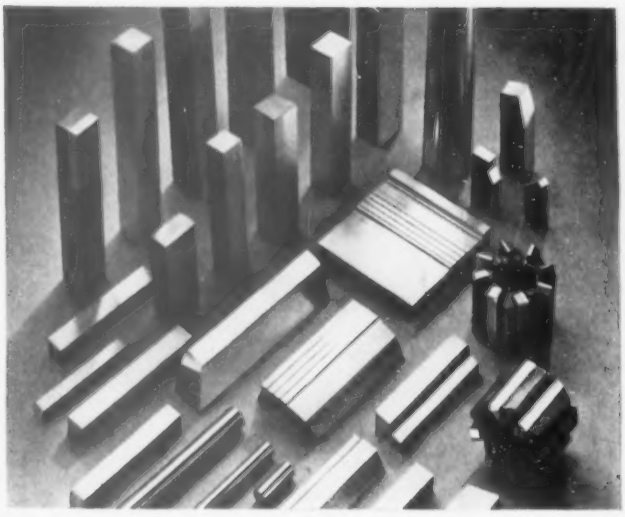
HOW TO SOLVE TOOL PROBLEMS



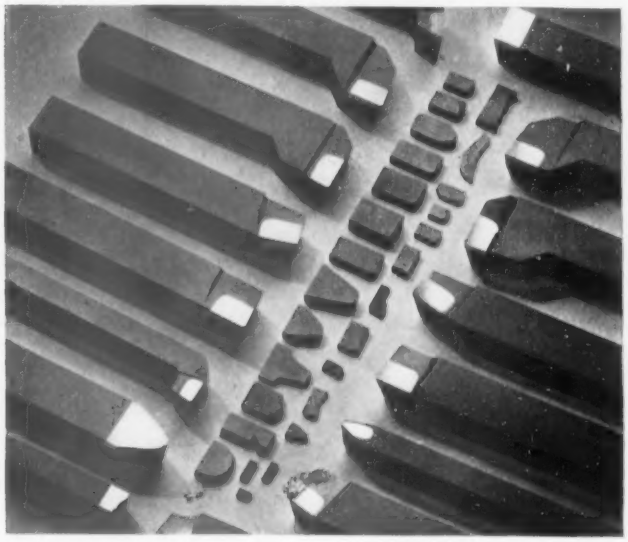
It Takes ingenuity to convert an old planer into a vertical miller, but that's just what they did at the Kerrihard Company in Red Oak, Iowa. They used a cream separator and a Model T transmission. Then they changed from high speed steel to Tantung. Results: 25% increase in speed, 1200% increase in tool life! Tantung is *tough;* gets top efficiency from old machines!



Here's a new lathe, powered for carbide tools. The operator is cutting X4130 at 409 r.p.m. That's a typical carbide job, but this wise operator makes his work easier, surer, faster and cleaner by using only Ramet carbide tools. You can get better results, too, by changing over to Ramet carbides now!



Tantung, the *only* cast, non-ferrous alloy containing tantalum carbide, wears from 2 to 25 times as long as high-speed steel. It has a red hardness far above that of any steel, and Tantung's self-lubricating action minimizes chip wear or "cratering." If you're using high speed steel tools now, switch to Tantung and then watch your production jump—your tool life lengthen!



The big difference between Ramet carbide tools and other kinds is this: Ramets are made with tantalum carbide. As in the case of Tantung tools, this means less chance of "cratering," a minimum of chip wear. For speed, dependability and *extra* service, you can't beat Ramet carbides. Specify them *from now on!*

VASCOLOY-RAMET'S COMPLETE TOOL SERVICE WILL SOLVE PRACTICALLY ALL MACHINING OPERATIONS. Naturally, you're interested in speeding up your production, cutting down idle machine time, producing more and better work in less time at lower cost. That's a big order, but you can do a lot towards filling it by using the Vascoloy-Ramet *complete tool service.* Replace high speed steel tools with modern, practical Tantung; install Ramet carbides wherever carbides are indicated. Then see—in your own production figures—what this better tool service does for you!

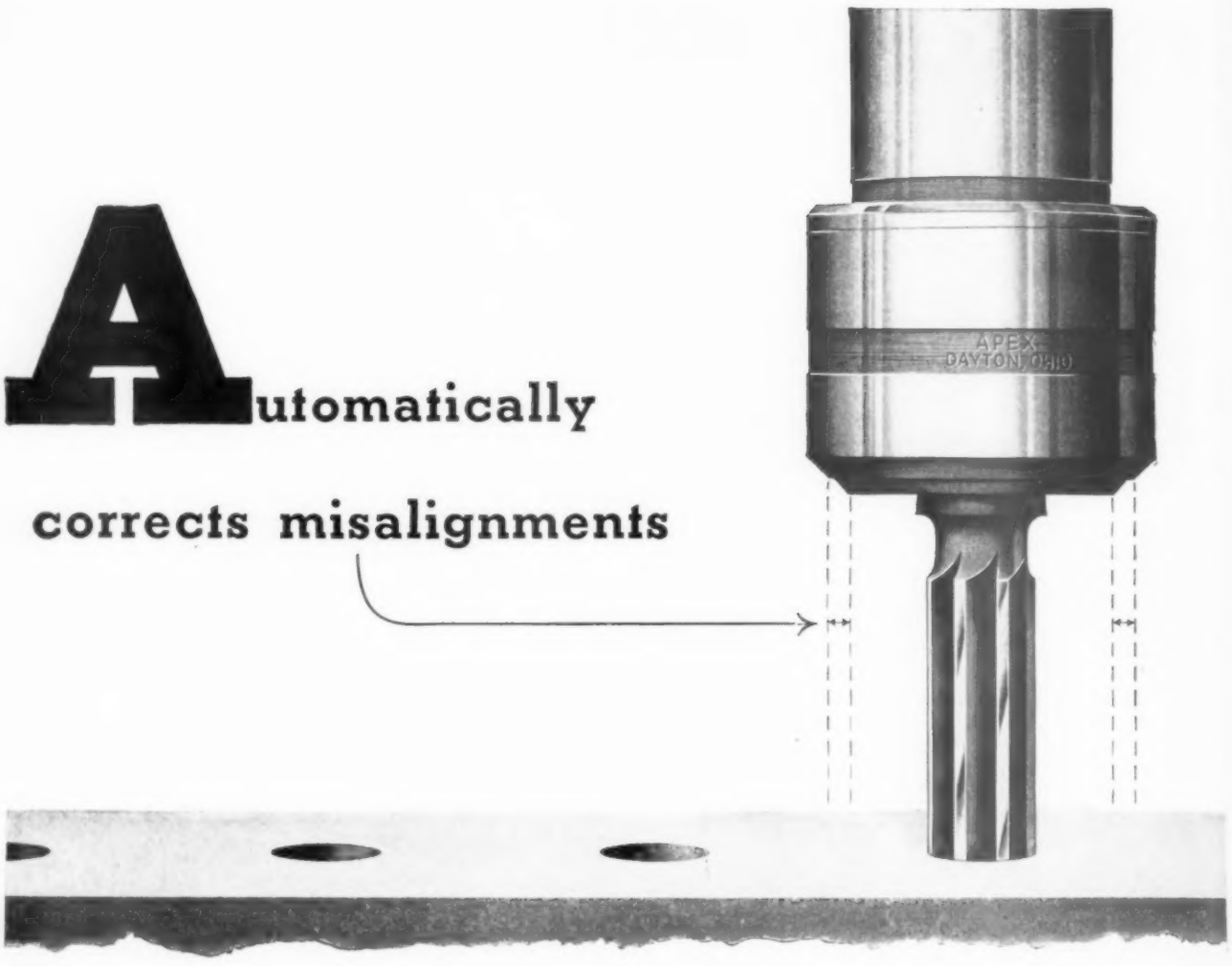
VASCOLOY RAMET CORPORATION

NORTH CHICAGO, ILLINOIS · DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES

IN CANADA: CARBIDE TOOL AND DIE COMPANY, LTD., HAMILTON, ONTARIO

4328

Automatically corrects misalignments



YOU GET *uniformly accurate* reamed, tapped or bored holes with Apex Floating Tool Holders. Why? Because the parallel floating action compensates for lateral misalignments between spindle and part. Patented ball drive practically eliminates all friction in the holder itself.

This holder prevents bell-mouthed and tapered holes.

The amount of float ranges from a few thousandths to $\frac{1}{16}$". You can specify the amount of float required within the above ranges.

Shanks supplied for most requirements. Sockets may be had for Morse Taper or straight shank tools. These holders are also furnished with quick change chuck on bottom so a series of tools may be used. Made in two styles; one uses square type collets and the other uses quick change drill collets. Write for Catalog 14.

Chuck bottom type Extended socket type

APEX

THE APEX MACHINE & TOOL COMPANY, DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

Photo by
U. S. Army Signal Corp

. . . RIGID
SPECIFICATIONS
FOR ACCURACY
AND SPEED
IN DUPLICATE
PARTS PRODUCTION
are met with

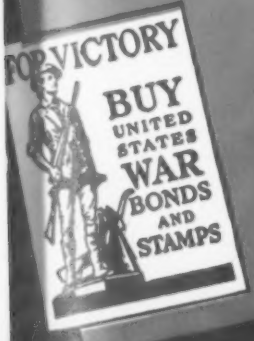
P&J Automatic CHUCKING EQUIPMENT

The urgent needs of war production in the Arsenals of Democracy are not only being met but records are being made one day only to be shattered the next.

Examples of remarkable performance are particularly interesting and frequent where operations are performed on P&J equipment. Developed primarily for duplicate parts production, these machines offer a range of tooling possibilities which are a constant challenge to the imagination of production engineers working toward highest productivity in shortest possible time. By taking advantage of this versatility in tooling, production problems are being readily solved.

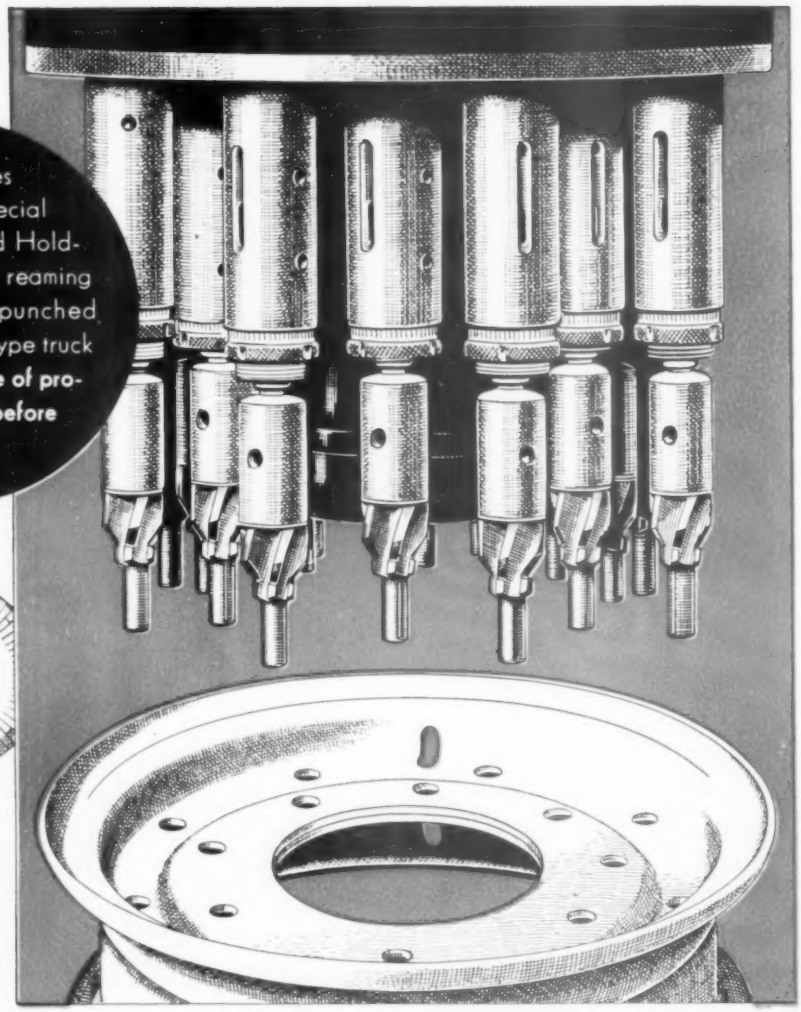
P&J service to war production plants is based on long experience in finding better and faster ways of handling jobs in parts production. P&J equipment and P&J tooling provide many opportunities to apply this service advantageously.

The POTTER & JOHNSTON MACHINE CO., Pawtucket, RHODE ISLAND



KEEP GUNS BLAZING AT THE FIRING LINE

Buy More WAR BONDS



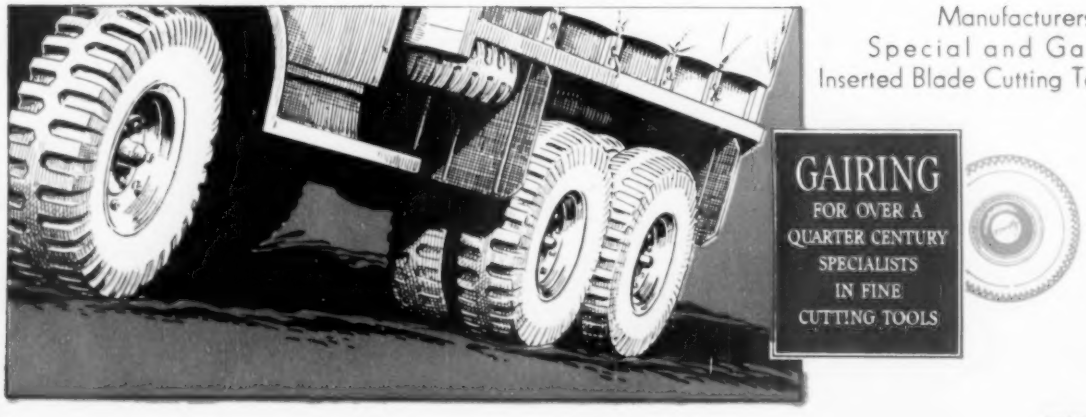
16 spindles of Gairing Special Cutting Tools and Holders, simultaneously reaming and chamfering punched bolt holes in split type truck wheels—**at a rate of production never before equalled.**

ARMIES ON WHEELS

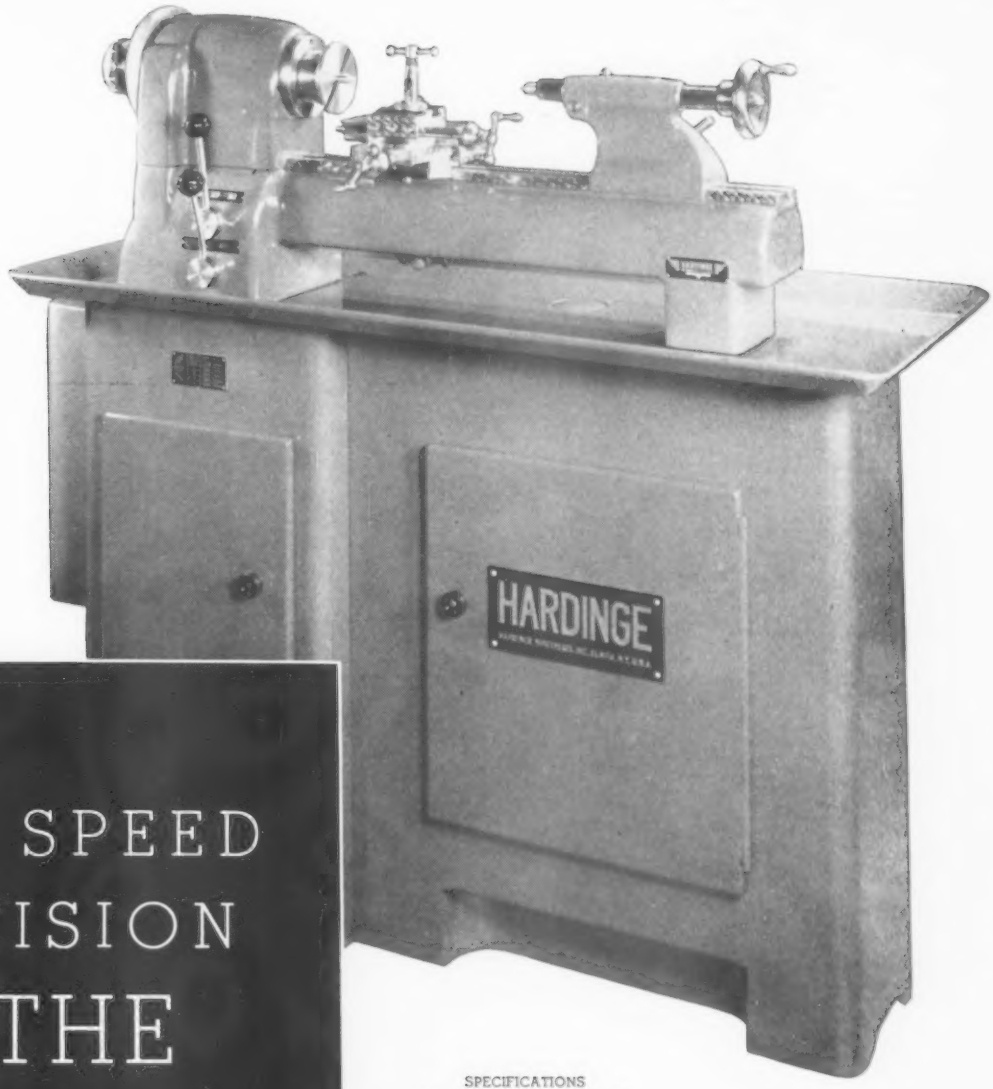
When the Automotive Industry rolled up its sleeves and went to war, it was given an assignment the results of which will rate high in modern military and industrial history. For the war vehicles it is producing has made a reality of a military necessity—Armies on Wheels: trucks, tanks, half-tracks, jeeps, et cetera—thousands and thousands and thousands of them. Yes, the Automotive Industry has gone to war for its Uncle Sam—**enlisted for the duration.** And Gairing, as in the past, continues to pass the ammunition—continues to supply the industry with the fine cutting tools necessary for the precision production of the parts with which war vehicles are made.

THE GAIRING TOOL COMPANY, Detroit, Michigan

Manufacturers of Standard, Special and Gair-Lock Inserted Blade Cutting Tools



HARDINGE



HIGH SPEED PRECISION LATHE

SPECIFICATIONS
1" collet capacity, 9" swing, 17" center distance, eight spindle speeds up to 4000 R.P.M.

Designed to meet requirements of extreme lasting accuracy, high spindle speeds and the ease in operation required for the smaller diameter work range found in every tool room, laboratory and production department.

The simplicity of operation enables relatively unskilled operators to produce parts to the necessary close limits without expensive tooling. Your larger, expensive equipment will not meet all of the foregoing requirements necessary for practical results and proper economy.

Because of the many advantages found through actual use, Hardinge Precision Lathes are being installed in ever-increasing numbers.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR

HARDINGE
ELMIRA, N.Y.

even spilled milk is good for something!

YOUR tool and die failures need not be a total loss. Now that you know what you don't need, let us suggest a solution for many of these problems.

If you have made the mistake of using a tool steel that is tough to machine, investigate Graphitic Steels. Their easy machinability resembles that of cast iron. If your dies and tools are subject to terrific abrasion and are wearing out faster than you think they should, ask about Graphitic Steels' wearing qualities. If you are having trouble with distortion in the thin sections of your dies, these same steels will solve your problems.

Ask for your copy of the new Graphitic Booklet which gives complete technical and performance data. The Timken Roller Bearing Company, Canton, Ohio. Steel and Tube Division.

For Victory–
For Economy–
You will find nothing better than Graphitic Tool and Die Steels for easy machinability and resistance to wear and distortion.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
GRAPHITIC STEELS

4" OF CAST STEEL REMOVED IN MILLING . . . . . BORE LOCATIONS HELD TO ±.001"

G & L Machine Used for Both Heavy Milling and Accurate Boring of 34-ton Part

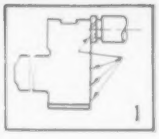
Here's another interesting example of machining extremely heavy parts. This 34-ton cast steel hydraulic press cylinder is completely machined in 3 settings. The machine used is a G & L No. 570 Floor-type Horizontal Boring, Drilling and Milling Machine with a 7" diameter spindle. The part is stationary and mounted directly on parallels on the floor plate. Bores are located by adjusting the column on the runway and the headstock on the column. The operator does this with ease through the use of electrical push-button controls located on the machine headstock.

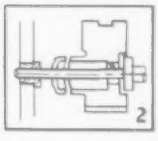
G & L Telescopic Vernier Sight Simplifies Locating Bores Accurately

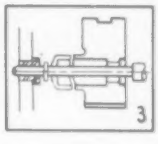
The machine is provided with a G & L Telescopic Vernier Sight which makes it possible for the machine operator to make settings in thousandths, *of both the headstock and column,* without leaving his operating position on the platform. This telescopic sight can be installed on any machine of this type which has scales and verniers. Write for Bulletin VS-1.

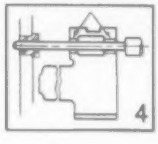
G & L machines are being used for an endless variety of machining operations on both small and large parts in many industries. With G & L attachments and accessories there is practically no combination of operations that cannot be performed with speed and economy. Feeds and speed ranges cover practically any cutting requirements.

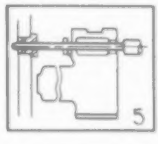
G & L engineers will be glad to make recommendations for faster machining of your work on G & L equipment.

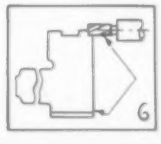


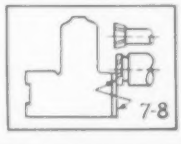


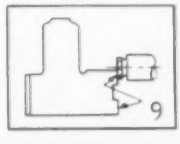












VERSATILITY FOR HEAVY DUTY AND ACCURATE MACHINING

1st Set-up

Set casting on parallels mounted on floor plate.

OPERATION 1—Face mill.

OPERATION 2—Pick up center bore and record vernier readings of headstock and column runway.

Bore, counterbore, chamfer 8"—48 3/4" and 39 3/4" diameter bores.

OPERATION 3—Backface 8" bore with Continuous Feed Facing Head mounted on bar.

OPERATION 4—Pick up, bore and chamfer three 15.437" holes and two 18" diameter holes, using scales and verniers on head and column runway.

OPERATION 5—Backface two 18" bores with Continuous Feed Facing Head before pulling bar out of the bores.

OPERATION 6—Take locating cut on pads to accurately establish their dimensions from the center bore. The reading of the headstock vernier will be the center bore reading, plus or minus, the distance the pad is from the center bore, plus 1/2 the diameter of the end mill used.

2nd Set-up

Set up on finished face on floor plate, aligning from the finished part of the pads.

OPERATION 7—Face mill pads.

OPERATION 8—Form mill inside edges of pad. (15° Dovetail Slide.)

3rd Set-up

Reverse casting, again, aligning from finished pads.

OPERATION 9—Mill pads similar to Operation 7.

GIDDINGS & LEWIS MACHINE TOOL COMPANY

132 DOTY ST., FOND DU LAC, WISCONSIN

FREE DATA *Information covering the complete line of G & L machines and time-saving attachments and accessories is included in this catalog. Write for your copy. Ask for Catalog No. 75.*

Hitting a "Speck" 5 Miles Up . . .

THAT'S PRECISION

As enemy aircraft approach and the ack, ack opens up, a tiny flaw in any mechanism might mean "target missed."

By *borizing* many important gun components to extremely close tolerances—often to .0002"—Heald Bore-Matics help put precision in anti-aircraft guns that gets specks 5 miles up. And because *borizing* assures constant duplication of accuracy, part after part matches identically.

It's no secret how Heald Bore-Matics get their extreme accuracy. It's simply the same Heald know-how in precision engineering that has made Heald Boring Machines and Heald Grinding Machines the answer in leading industries demanding close tolerances, high-speed production and cost reduction.

Heald Engineers are always ready to help you with your precision boring and grinding jobs. Ask for their services. They'll help you step up production through specially designed tooling and fixtures . . . specially designed for your Heald and for your own particular requirements.

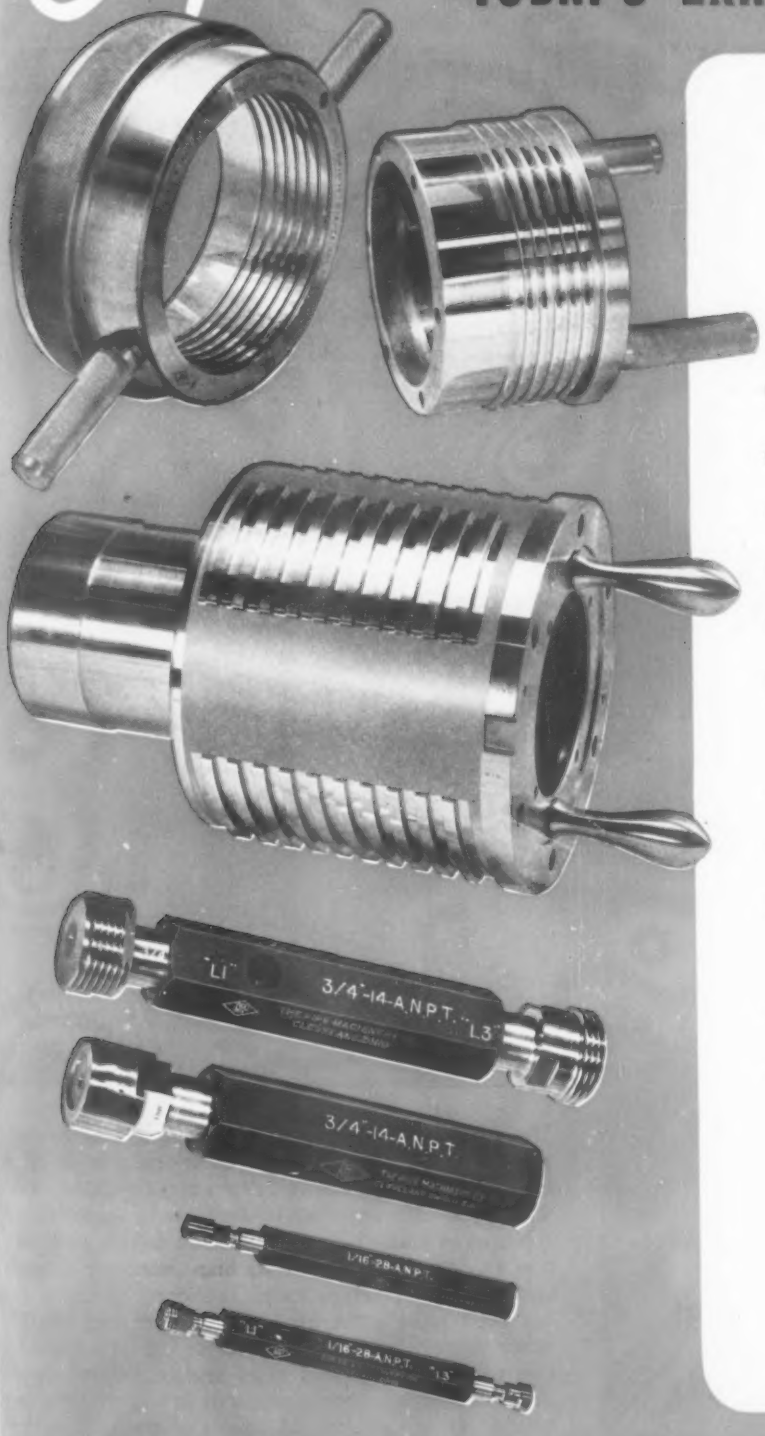
Borizing a casing for Bofors 50 mm anti-aircraft guns. First operation bores two 3.375" diameter holes spaced 4.125" apart using a cross slide of indexing. Then work is indexed 90° and two holes 1.500" are bored in line by means of opposed heads.

The HEALD MACHINE CO.
WORCESTER, MASS. U.S.A.

FOR MORE PRECISION *FASTER*

BRING YOUR PROBLEMS TO HEALD

Gages THAT MEET TODAY'S EXACTING STANDARDS



ARMY E NAVY

To insure uniformity of close dimensions, and complete interchangeability of parts, gages that can be depended upon are more important than ever in modern mass production.

The gages that have been specially made for the armament program will find many applications when peacetime manufacture is resumed.

Gages bearing the PM Diamond Emblem will be found precise in dimension and perfect in finish.

Your inquiries will be welcomed.

PMCO

The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • HOBS • MILLING CUTTERS • SPECIAL TOOLS

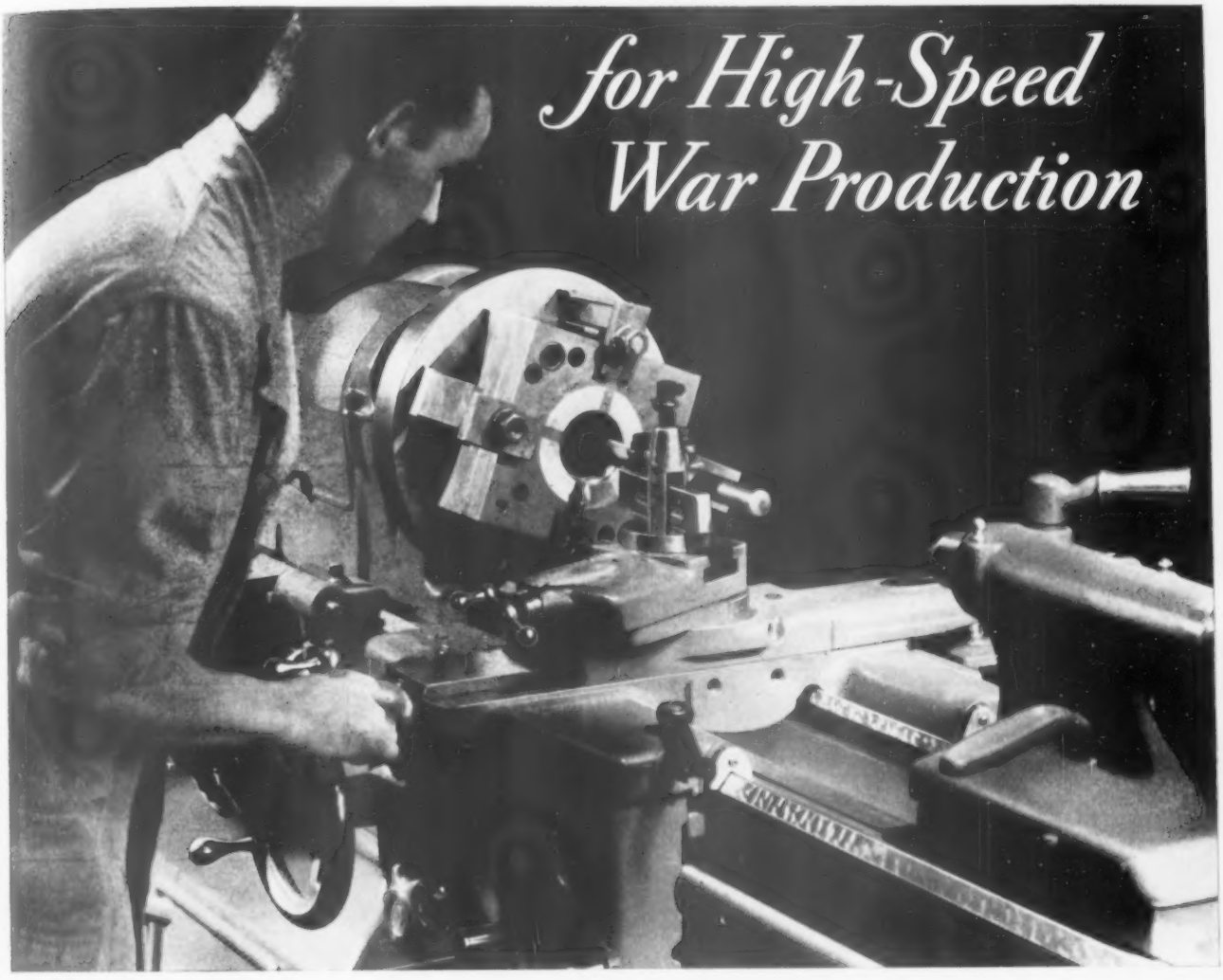
SEVERITE HEAT-TREAT PROCESS DOUBLES THE LIFE OF YOUR NEW AND REGROUND CUTTERS

"Severite," an exclusive high speed tool steel hardening process, is now available at no additional cost on all new Severance Midget Milling Cutters and any make of tools which you have reground by Severance. "Severite" is the result of exhaustive experiments and field testing on the part of Severance engineers to help conserve America's critical supply of High Speed Tool Steel. And the result has been most gratifying—users report that the "Severite" process increases the efficient life of cutters from two to five times. This extra service, offered only by Severance, is one more reason why it will pay you to use new Severance Midget Milling Cutters and Severance Regrinding Service. Write for complete information and prices.

Severance

SEVERANCE TOOL INDUSTRIES INC., SAGINAW, MICHIGAN.
PLANTS IN LONG ISLAND CITY, NEW YORK; CHICAGO; DETROIT; FORT WAYNE, INDIANA; LOS ANGELES

HIGH PRECISION



High precision is the key to high speed war production—for mass production is based on a degree of accuracy that assures the perfect interchangeability of parts and units.

In hundreds of war production plants, South Bend Lathes are preferred because their high precision makes it easier to maintain exacting tolerances on important toolroom and production operations.

Modern in design, built to the highest standards of workmanship, South Bend Lathes are capable of performing finish turning and boring operations with such accuracy that subsequent grinding, honing, or lapping operations can often be eliminated. A wide range of spindle speeds permits taking full advantage of carbide or diamond tipped tools.

Convenient controls make for an ease of operation which reduces fatigue and lessens the possibility of error. Requiring a minimum of effort to run, South Bend Lathes are especially desirable where women lathe operators are employed. Write for your copy of Catalog 100C which describes South Bend Engine Lathes, Toolroom Lathes and Turret Lathes.

Buy War Bonds!

ARMY (E) NAVY

"HOW TO RUN A LATHE"

A practical operator's handbook for apprentice training that covers the fundamentals of lathe operation. It contains 128 pages, 5⅛" x 8", and over 365 illustrations. Price 25c per copy. Sample copies free to shop superintendents and apprentice supervisors.

SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA • LATHE BUILDERS FOR 36 YEARS

Use Standard Jig and Fixture Parts

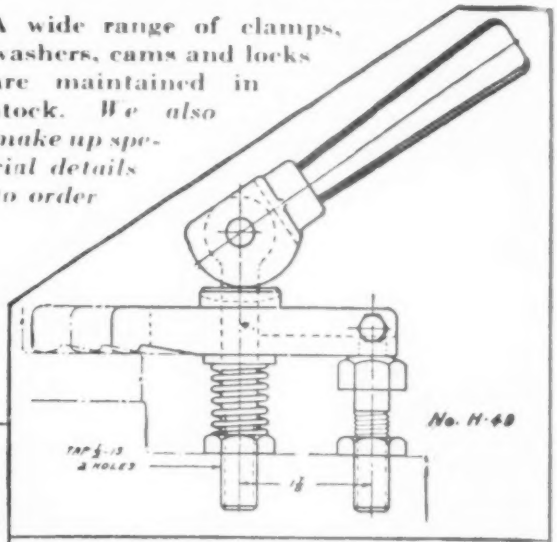
Save 50% Designing Time and Many Man-Hours in Construction

HOW TIME IS SAVED:

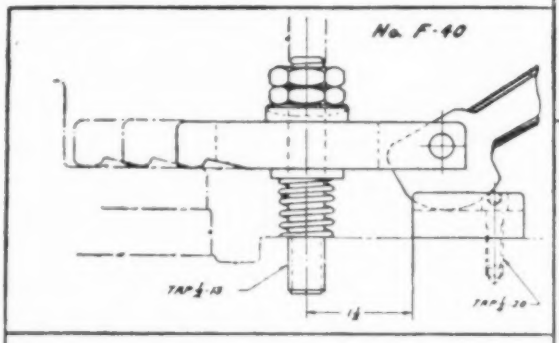
(1) Check your assembly drawings, note details
(2) Select details from Siewek Catalog (loose-leaf binder with working drawings on each page)
(3) Remove sheets with details selected, insert under layout and trace, show location and size of necessary holes
(4) Mark detail with Siewek Catalog number

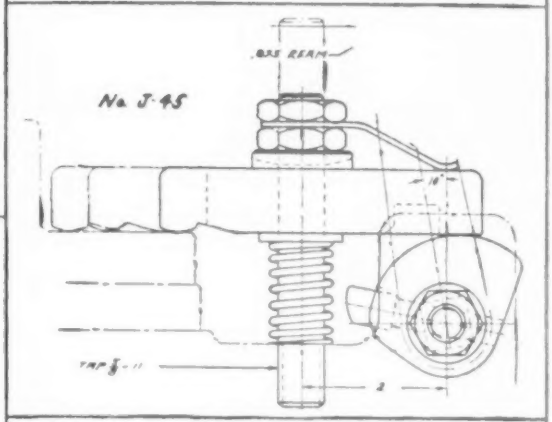
Clamps, Cams, Washers, Nuts, Clamp Rests and Hinge Pins are hardened. Studs are alloy steel heat treated.

A wide range of clamps, washers, cams and locks are maintained in stock. *We also make up special details to order*

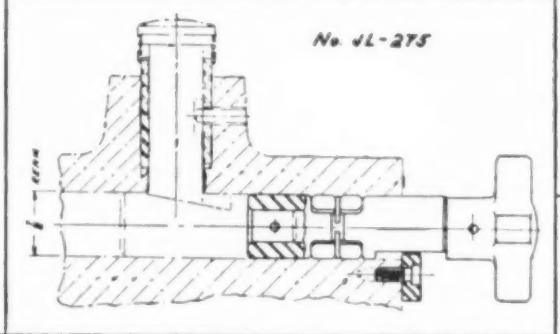


Clamp Assemblies
H-40
J-45
L-60
C-40
F-40
M-15

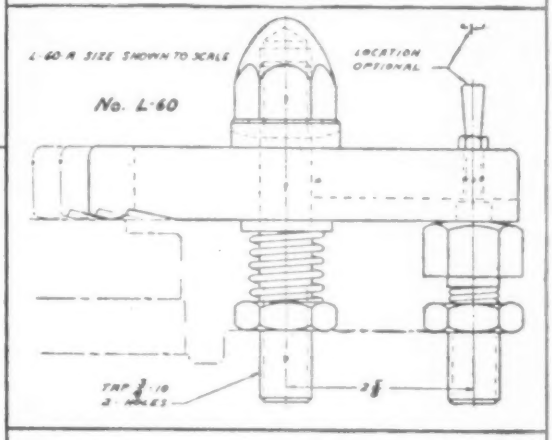


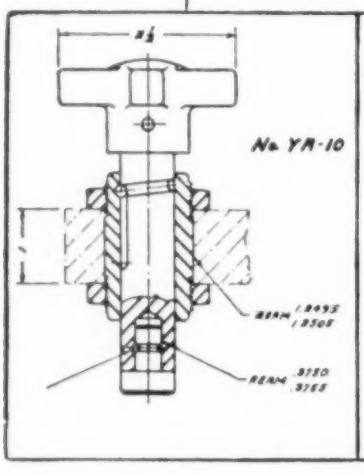


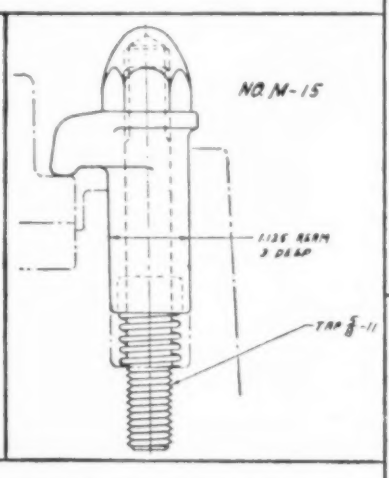
Jack Lock
JL-275

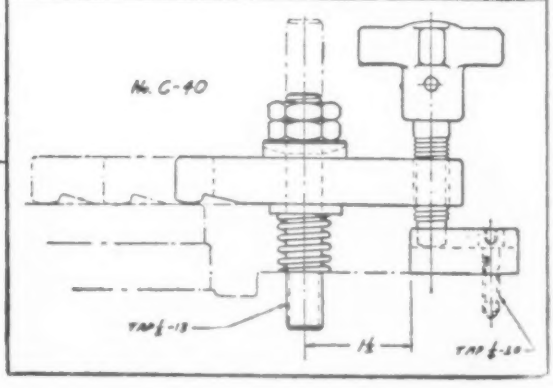


Cam Long Lock Travel Clamp
YA-10









Send TODAY for your copy of Siewek loose-leaf, template tracing catalog.

SIEWEK TOOL COMPANY

2348 Wolcott St. Ferndale, Mich.

With that curtly classic reminder, one of America's most famous research engineers replied to a man in the act of rhapsodizing about the wonderful ingenuity of man.

For the barnacle, he pointed out, is a symbol of all those things that have *not* been done — a tiny marine organism that costs us millions every year — simple, "impossible" things that are still to be accomplished.

The development of lighter and stronger alloys, permitting 3, 5, or even 10 horsepower for every pound of engine weight, instead of one-to-one . . . cheaper color photographs and faster engravings and better television . . . swifter ways of making and working new super-hard alloys . . . scores of different kinds of rubber "growing" on factory floors, and fuels 3 or 4 times as powerful as 100-octane gasoline . . . even solar energy, and atomic power, and — remember the barnacle! These are but a few from a list of certainties and possibilities as long as man's imagination.

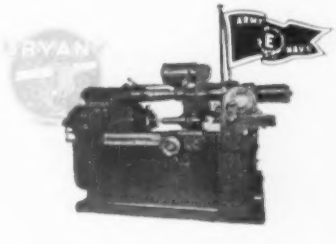
Under the secrecy of forced-draught war research, many incredible accomplishments — seemingly impossible within our time — have already occurred. For obvious reasons, these may not be discussed, but of one thing we can be certain: The end of this war will inaugurate the greatest era of industrial surprises since the age of machinery began.

And the shift to light metals and plastics may be as consequential as the shift from bronze to iron!

We at Bryant have developed many new techniques during the past few months. Our engineers are working on hundreds of production lines today, helping to solve production problems involving the machining of hard rubber, plastics, glass, graphite, cast iron and bronze, as well as forged, centrifugally cast and surface-hardened steels, light metals and alloys from a hundred new specifications.

If this wealth of new experience can be of value to your business, it's there for the asking. For Bryant's Consulting Service on internal grinding is available to you at all times.

Call upon us now!



Bryant Chucking Grinder Company

SPRINGFIELD, VERMONT, U. S. A.

SEND FOR THE MAN FROM BRYANT

Uniformity of thermal treatment and dependable quality in all finishing operations, are essential in the making of a steel that will flow smoothly and rapidly through your production machinery.

The modern and extensive Aristoloy finishing facilities, are completely integrated and assembled in our Warren plant. This centralized manufacture results in undivided quality responsibility through each steel-making step from melting to finishing.

COMPLETE MODERN FACILITIES FOR
annealing and heat treating
rough-turning • centerless grinding
turning and polishing • cold drawing

ARISTOLOY STEELS

CARBON TOOL STEELS
ALLOY TOOL STEELS
AIRCRAFT QUALITY STEELS
BEARING QUALITY STEELS
STAINLESS STEELS · NITRALLOY STEELS

COPPERWELD STEEL COMPANY WARREN, OHIO

They said, "NO EXPERIENCE NEEDED!"

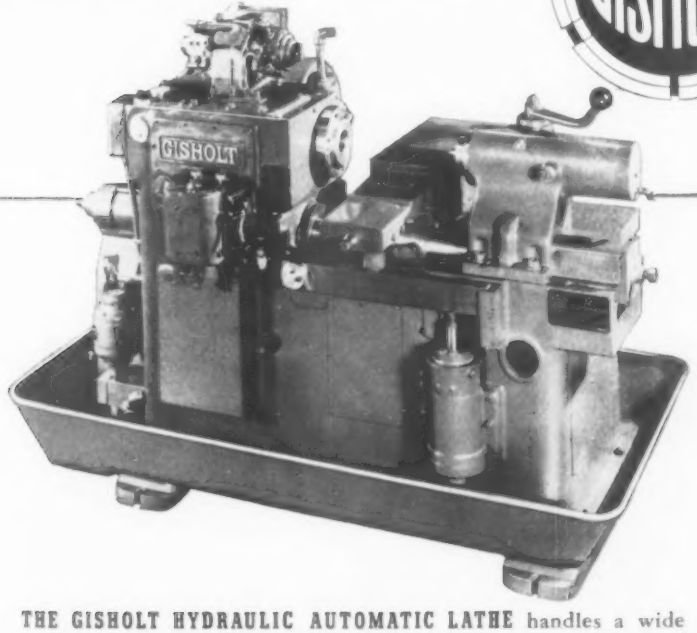
It's hard to imagine a machine easier to run than the Gisholt Hydraulic Automatic Lathe. Here, one small lever controls a whole cycle of machining operations. With but little more to do than load the chuck and remove finished work, one operator often tends several machines. Yet, here is sustained high-speed production and accuracy no skilled machinist could equal on a non-automatic lathe.

GISHOLT MACHINE COMPANY

1229 East Washington Avenue • Madison, Wisconsin

Look Ahead . . . Keep Ahead . . .
With Gisholt Improvements in Metal Turning

GISHOLT



THE GISHOLT HYDRAULIC AUTOMATIC LATHE handles a wide variety of chucking and between-centers work. Its extremely rigid construction permits multiple cutting with accuracy at high cutting speeds. Ask for literature.

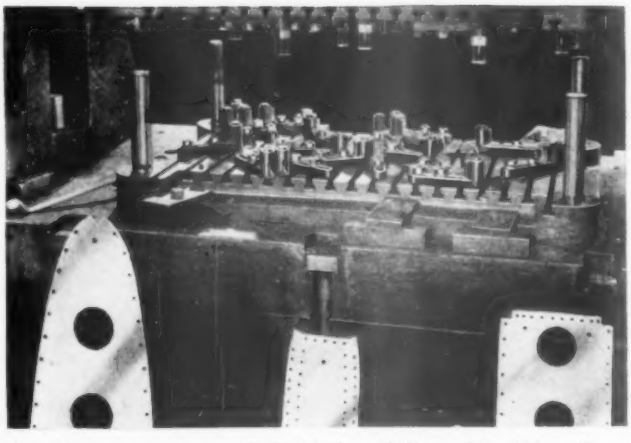
TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

ADJUSTABLE DIES
SPEED WAR PRODUCTION

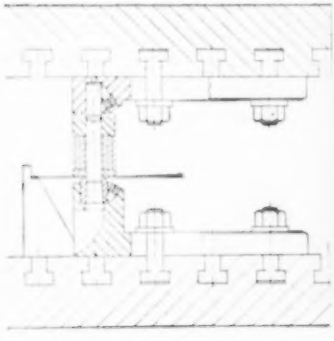
INCREASE HOURLY PRODUCTION—REDUCE "DOWN" TIME

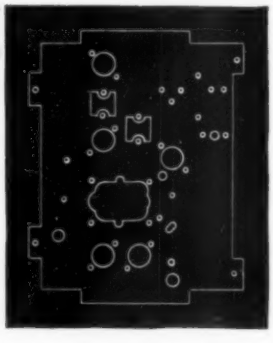
Whistler adjustable die set-up for 12 foot power brake. These same punch and die units can be quickly rearranged for other patterns.

Whistler Adjustable dies are saving the day in war plant "speed-up" schedules by... saving weeks of time normally required in single purpose die making... units can be used over and over in different patterns... new set ups on or off the press in minutes... all parts interchangeable ...work on any type press... perfect precision on long or short runs... no special tools and new workers quickly learn to make press changes.

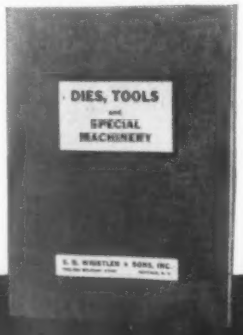


Another grouping of Whistler Adjustable Dies illustrating re-use of same units. Note close grouping of perforations.





Side view showing construction detail of U-50 Whistler Adjustable Punch and Die unit and typical example of perforated and notched piece produced by Whistler Dies.

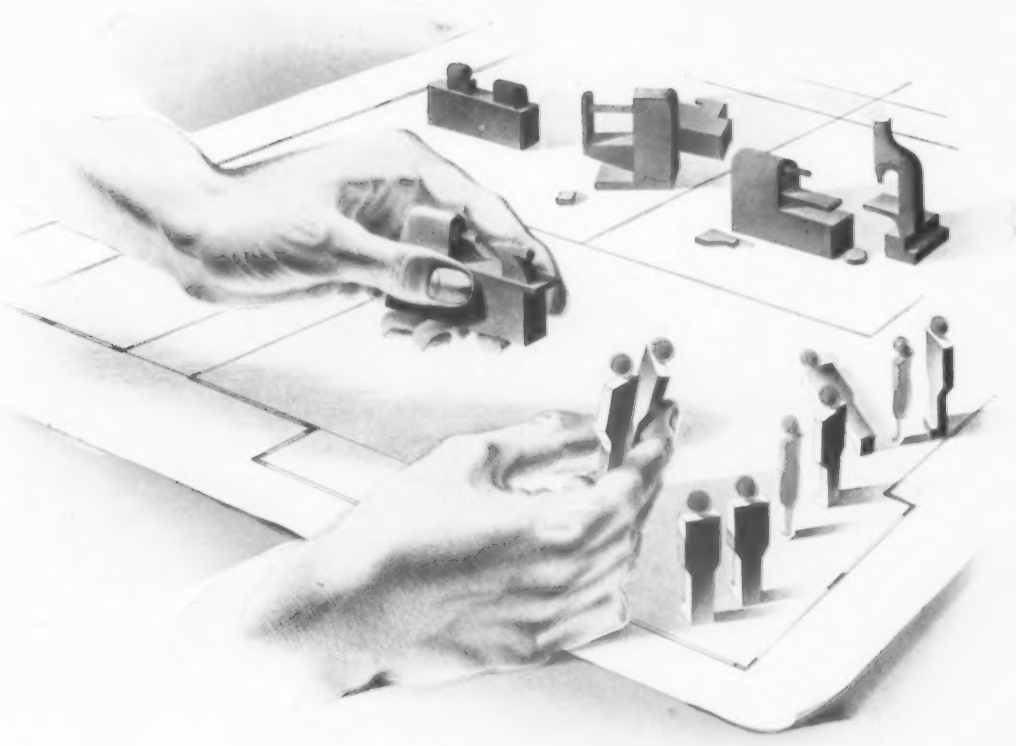


Over 25 Years of Tool and Die Making Experience

S. B. WHISTLER & SONS, Inc.

752-756 MILITARY ROAD BUFFALO, N. Y.

Every Production Executive needs this fully illustrated catalog. Sent upon request.



How to get out More Work!

The one-time easy answer —"get more machines and put on more men"— isn't so easy nowadays. Yet there are two practical available answers right now, as **HECKER** is demonstrating in scores of blue-chip war plants.

The first, of course, is improved production tools—jigs and fixtures of better design and construction. **HECKER** tool engineers and tool makers are putting both SPEED and ACCURACY into these tools to show results on your production line in higher volume of quality output.

But the second **HECKER** answer to getting out more work is *production plant layout.* The purpose of this service is to cut the time and carry *between processes,* and give you the savings in more production.

In both of these services, **HECKER** specialists have the important advantage of direct and continuous contact with heavy volume production of precision parts for aircraft in the **HECKER** fabrication plants. In a practical sense, they have an "efficiency laboratory" not more than five minutes away.

Your queries are invited, by correspondence or personal contact. Let us know when a Project Engineer can see you.

Address A. W. Hecker,

1988 East 66th Street, Cleveland, Ohio. 332 So. Michigan Ave., Chicago, Ill.

517 New Center Building, Detroit, Mich. 3723 Wilshire Blvd., Los Angeles, Calif.

The booklet, "Tooling for Speed and Accuracy", will be sent on request.

A·W· Hecker

DESIGNERS AND BUILDERS OF TOOLS, JIGS AND FIXTURES . . . FABRICATORS OF AIRCRAFT PARTS

You can handle jobs like these faster, more accurately—at lower cost with the

SUNNEN PRECISION HONING MACHINE

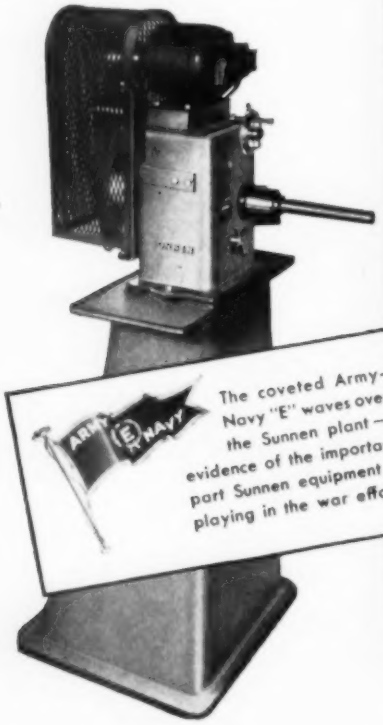
Hones and finishes internal cylindrical surfaces from .185" to 2.625" in diameter—with a guaranteed accuracy of .0001". Produces a super-smooth finish of 2 to 3 micro inches.

Does not require skilled labor—in many plants girls in 'teens are handling jobs in tenths.

No jigs or fixtures needed—work is held in hands. Relieves big internal grinders for other jobs.

Low in cost, economical to operate. Fast — can be "set up" for any size in its range in less than a minute.

Let a Sunnen engineer check your job in your plant with this equipment—or write for bulletin giving complete information.



The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

Carbureter Idler Valve Jet. Hole is honed after reaming for smooth action.

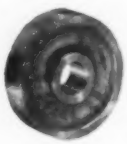
Cast Iron Valve Stem Guide. ½ to one thousandth removed—220 pieces per hour. Better finish and straighter hole.

Roller Bearing Outer Race. Finish improved from 12 micro inches to 2 micro inches.

Idle Control Valve Seat. Due to large "windows," almost impossible to get straight round hole by grinding. Sunnen solved the problem.

Bearing. A very small part. 2 micro inch finish necessary.

Hydraulic Valve. Previous method of grinding threw radius on edge of "windows." Sunnen honing eliminated trouble.



Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.

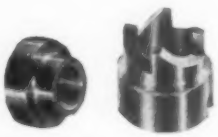
Hydraulic Metering Valve Stem. Hole .156" in diameter; reamed, heat treated, and then honed. Honing 3 times as fast as previous method.

Wing Bracket. Two ¼" holes must be in line. Honing increased bearing surface and reamer life.

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

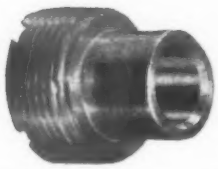
Aircraft Hydraulic Brake Cylinder. Honing three times faster than lapping—and gave a straighter hole.

Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.

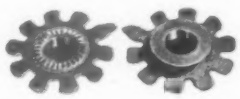


Aircraft Instrument Panel Control Wire Bushing. Hole .187" diameter—held to .0002", stock removal .001", sixty per hour.

Counterbore Cutter. Very small part and because of this fact hard to handle by any other method.

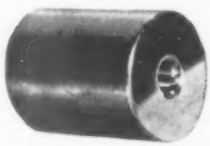


Pump Shaft Bushing. Bronze; honing follows reaming. Sunnen method greatly reduced valve leakage.



Calculator Machine Gears. Cut from hole which is reamed and then honed. Honing maintains same pitch line concentricity.

Aircraft Valve Guide. Valve tappet roller pin hole honed to 6 micro inch finish.



Header Die. Life of header dies increased 3 to 9 times over lapping. Knock out pin breakage practically eliminated.

Carbureter Metering Jet. Two black bushings Bakelite. Line honing by Sunnen method.

Spur Gear. By honing gears direct from heat treatment, concentricity of pitch line is maintained.

SUNNEN PRODUCTS COMPANY, 7932 Manchester Avenue, St. Louis, Mo.

Canadian Factory, Chatham, Ontario

WEAPONS OF CONSTRUCTION!

The craftsmen making National cutting tools today know that they are making more than tools. They know they are making weapons —the weapons with which weapons are made.

In your hands these tools deserve the same care and attention that a soldier gives his rifle. Keep them fighting by keeping them working. Keep them working by keeping them sharp.

NATIONAL

NATIONAL TWIST DRILL & TOOL © DETROIT U.S.A.

TWIST DRILLS
REAMERS, HOBS
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS

TWIST DRILL AND TOOL COMPANY

HOME OFFICE AND FACTORY—DETROIT, MICH.

Tap and Die Division—Winter Brothers Co., Wrentham, Mass.

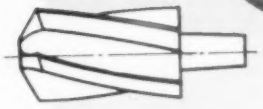
Factory Branches • New York • Chicago • Cleveland • San Francisco • Distributors in Principal Cities

MIDWEST Core Drills

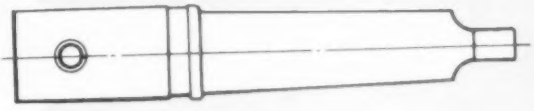
FOR ENLARGING DRILLED, PUNCHED FORGED OR CORED HOLES

SAVES VITAL HIGH SPEED STEEL

HIGH SPEED DRILL TIP
STYLE NO. 410
Sizes: ⅝" to 3"



PLAIN CORE DRILL HOLDER
STYLE NO. 1410
Recommended for relatively shallow work with drill tips ⅝" to 1 1/32" dia.



PILOT BEARING CORE DRILL HOLDER
STYLE NO. 1415
Designed for operation through jig bushings with drill tips 1" to 1 15/32" dia.

FLUTED CORE DRILL HOLDER
STYLE NO. 1420
Recommended for deep hole work with drill tips 1½" to 3" dia.

MIDWEST DRILL TIPS are made from selected high speed steel; Midwest Holders are made from tough alloy steel. This combination of Tip and Holder saves vital steel by taking the place of solid high speed core drills which are costly and often quickly go undersize. Midwest Tips can be ground many times before replacement is necessary and when worn out a new one can be inserted in the original holder without removing the holder from the machine.

These core drills and holders are provided with the rigid and accurate Midwest Taper and Pin Drive, and the combined Tip and Holder has all the advantages of a solid steel drill.

Midwest Core Drills are furnished to fit plain, piloted type or fluted type holders as illustrated above. Further information on Midwest Core Drills and other Precision Metal Cutting Tools is contained in Midwest Catalog 17.

MIDWEST TOOL & MFG. CO.
2364 W. JEFFERSON AVENUE, DETROIT 16, MICHIGAN

MIDWEST

Engineers and Manufacturers of Precision Metal Cutting Tools which contribute to the progress, prosperity and comfort of mankind

MILLING CUTTERS • SLEEVES • COUNTER BORES • END MILLS • REAMERS • SPECIAL TOOLS • FORM TOOLS CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS

ANOTHER EXAMPLE OF *JOB TESTED* MIDWEST TAPER AND PIN DRIVE

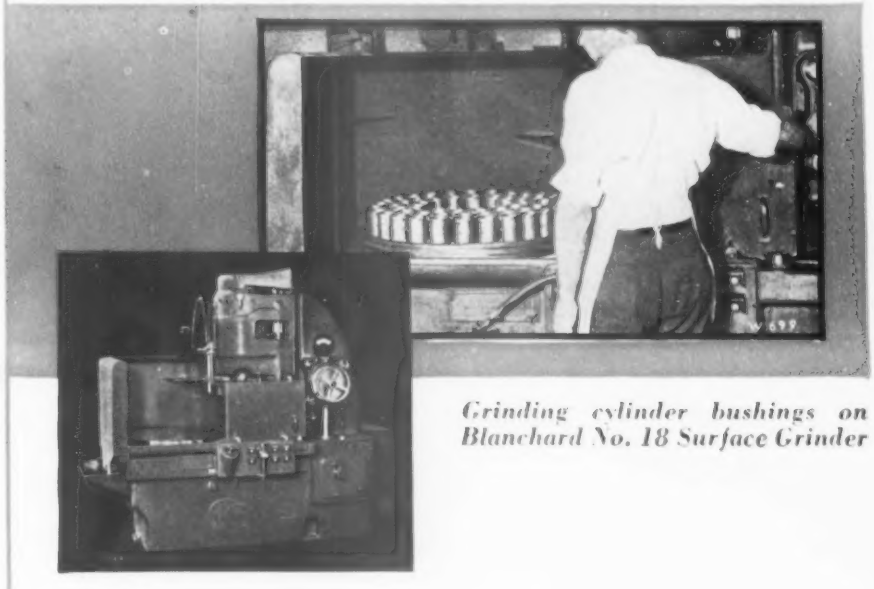
"PUT IT ON THE BLANCHARD"

BLANCHARD

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ **Production**
- **Adaptability**
- ★ **Fixture Saving**
- **Operation Saving**
- **Material Saving**
- **Fine Finish**
- **Flatness**
- ★ **Close Limits**

★ . . . . . *Especially valuable on jobs like the one illustrated.*



Grinding cylinder bushings on Blanchard No. 18 Surface Grinder

THESE cylinder bushings, 3½ inches high by 3½ inches in diameter, are of extremely thin section, yet they are held securely on the Blanchard No. 18 magnetic chuck. These bushings are Gunite castings. .006″ of stock is ground off both ends to limits of ±.0005″ for size, and .0005″ for parallelism. 50 pieces (100 surfaces) are ground per hour.

Multiple chucking and grinding on the Blanchard is the sure and economical way to machine parallel surfaces on parts such as these, also on collars, gear blanks, and washers.

The Blanchard Magnetic Chuck is so adaptable to holding a wide variety of work that it takes the place of many expensive fixtures that would be necessary on other types of machines.

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

2 Things to Remember

WHEN YOU ORDER HACK SAW BLADES

"A Borg-Warner Product"

First You need not be seriously handicapped by the restrictions on 18-4-1 for Hack Saw Blades, due to the shortage of vital alloys. The timely development of D-B-L Steel gives you lower cost blades with tough cutting edges, high impact resistance, and relative freedom from decarburization.

Second Only Ingersoll Steel Mills have had 4 years' experience in producing sheets of D-B-L Steel exclusively for Hack Saw Blades.

Blades made of Ingersoll D-B-L Steel are available from leading makers of Hack Saw Blades. Be doubly sure of satisfaction by specifying—"Made of Ingersoll D-B-L Steel"—on orders for Hack Saw Blades.

INGERSOLL D-B-L HACK SAW STEEL

(Tungsten 5.00-6.00
Molybdenum . . 4.00-5.00)

The remarkable performance of Ingersoll D-B-L . . . its relative freedom from decarburization . . . its tough cutting quality and its high impact resistance . . . plus its lower cost, have made it a wartime favorite.

INGERSOLL SPECIAL STEELS FOR SPECIAL USES

Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels.

INGERSOLL STEEL & DISC DIVISION

BORG-WARNER CORPORATION

NEW CASTLE, INDIANA

Plants: New Castle, Indiana; Chicago, Illinois; Kalamazoo, Michigan

INGERSOLL D-B-L HACK SAW STEEL

They cut turning time in half!

Monarch lathe, equipped with automatic sizing, turns these shafts *automatically*. Similarly, step boring and facing, contour facing, boring and turning and other combinations of straight and taper turning, can be done fast and accurately. Production is increased, unit costs are cut, and men and machines released for other work.

Timesaving qualities of Monarch lathes have never been so important as now. Take, for instance, the job of shaft turning, illustrated. By doing this on a Monarch lathe, equipped with automatic sizing, turning time is cut in half. With the countless numbers of such pieces being used in war production, the saving in time, and increase in production, can readily be appreciated.

Automatic sizing converts a standard Monarch lathe into an automatic engine lathe, for mass production of a wide range of turning, boring and facing operations, all within the required limits of accuracy. One operator can easily run two or three machines, thus again helping to increase output, in the present emergency.

If you are interested in saving time, now or in the future, we suggest that you set your production schedules with Monarchs as the standard lathes.

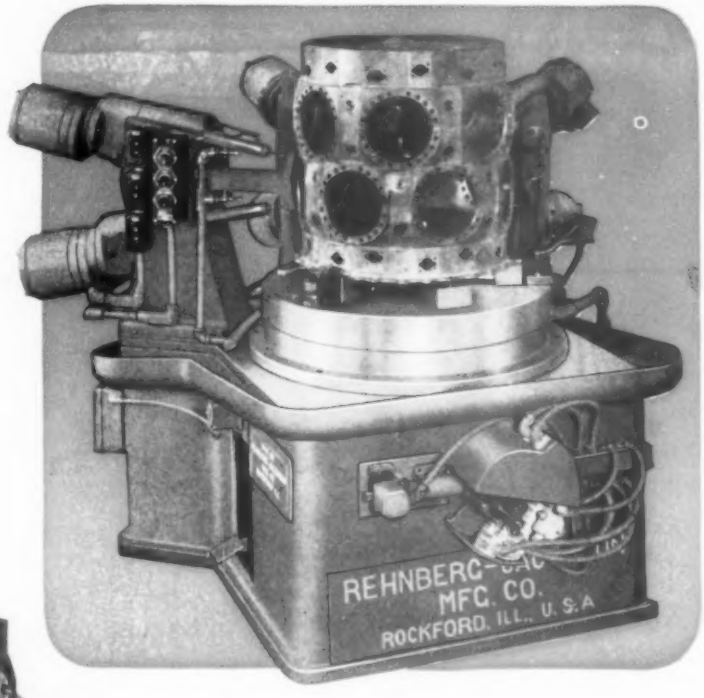
MONARCH LATHES
Save Time

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

REHNBERG-JACOBSON *Aircraft* PRODUCTION MACHINES

TWO SPECIAL MACHINES FINISH 28 HOLES IN CRANKCASE SIX TIMES FASTER THAN PREVIOUS METHOD . . .

Between each pair of deck pads on this 14-cylinder Cyclone crankcase, there are two holes which are used as locating points for various clips and brackets. Two special Rehnberg-Jacobson machines were designed to finish these holes. The first machine drills, spotfaces, and back countersinks two holes at a time; the second machine combination reams and countersinks, and taps. Each machine is a combination of an R-J Index Unit and Rehnberg Drill Units and Tap Units, all mounted on a suitable base.



RELEASE NINE MACHINES FOR OTHER WORK

This operation was formerly done on standard radial drills, using a rocking and indexing fixture. The two Rehnberg-Jacobson machines not only released the nine standard radial drills for other work, but perform the operation *six times as fast.*

Just One Example . . .

of the many ways in which Rehnberg-Jacobson machines have been designed to accomplish important war production jobs faster, and at lower cost. Write for further information.

REHNBERG R-J JACOBSON

REHNBERG-JACOBSON MANUFACTURING CO.
Special Machinery
2137 MISHWAUKEE ST. ROCKFORD, ILLINOIS

STELLITE 98M2 METAL-CUTTING TOOLS

For Machining Steel . . . Available for Immediate Deliveries . . .

Stellite 98M2 tools are made of a cobalt-chromium-tungsten alloy especially designed to increase the speed of machining steel. Developed by Haynes Stellite Company and Union Carbide and Carbon Research Laboratories, Inc., Units of Union Carbide and Carbon Corporation, this new alloy represents another achievement in the production of non-ferrous alloy cutting tools.

Tested on War Production—Stellite 98M2 tools have been thoroughly tested in the machining of many types of steel parts needed in the war program and are now being used for a wide variety of operations on such parts. Specific operations for which Stellite 98M2 alloy tools have proved especially suitable include turning, facing, boring, grooving, and forming of all types of steel.

High Rates of Metal Removal—These tools have proved that they will machine steel at even higher cutting speeds than Stellite Star J-Metal tools or Stellite "2400" tools, and with longer life between grinds. With the new tools, heavy roughing cuts can be taken with coarse feeds — to get high rates of metal removal —yet tool life is long and economical, for this new alloy has an *unusually favorable balance of red hardness, edge strength, and toughness.*

Available Forms—Stellite 98M2 tools are furnished as standard square and rectangular tool bits and welded-tip tools. Many sizes and types are available for immediate delivery. In addition, Haynes Stellite Company is prepared to furnish special tools made of this alloy, cast and ground to customers' specifications.

Send for this new descriptive price list. It will help you select the sizes and styles of Stellite 98M2 Metal Cutting Tools you require.

STELLITE
Reg. U.S. Pat. Off.

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York, N. Y. UCC Kokomo, Indiana

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

The words "Haynes Stellite," and "Stellite" are registered trade-marks of Haynes Stellite Company

A Winning Team!

YOUR riveters will score a new high in production speed if they use these three Cleco products.

CLECO SHEETHOLDERS afford the best method of holding metal sheets together while riveting. They are 80% faster than holding screws, and exert 50 lbs. of *even* clamping pressure. The Exclusive Cleco Repair and Exchange Service permits quick replacement of damaged sheetholders.

CLECO SMALL RIVETERS include both "slow" and "fast" hitters, in many sizes and handle styles—the *right* riveter for *every* job. They strike accurately controlled blows, at the proper speed and power, causing the rivet metal to flow uniformly without structural deterioration. A complete line of Squeeze Riveters also available.

CLECO RIV-N-JECTORS consist of a magazine holding about 50 rivets that can be released one at a time into the rivet hole. Actual tests prove Riv-N-Jectors save 90% of the rivets lost when handled by hand. They enable operators to insert and drive 30 rivets per minute.

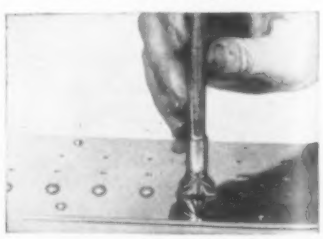
These Cleco Tools insure fast, efficient riveting with minimum waste.
Write for Bulletins 87, 85 and 89.

THE CLEVELAND PNEUMATIC TOOL COMPANY
3781 East 77th Street **Cleveland, Ohio**
BRANCH OFFICES IN ALL PRINCIPAL CITIES

BUY U. S. WAR BONDS AND STAMPS

A popular model riveter with the BW handle.

Inserting Cleco sheetholders with our latest design pliers.



Inserting a rivet with the Riv-N-Jector.

MACKLIN GRINDING WHEELS

HELPFUL HINTS and Safety Suggestions

YOU MEAN YOU SHOULD ALWAYS TRUE THE WHEEL FROM THE CENTER?
When using diamonds for the truing operation, always start from center and work to corners. This is done as a precautionary measure, as the corners wear to a slightly smaller diameter. .001" per pass should be sufficient.
HEY! DONT TRY TO REMOVE ALL THE STOCK IN ONE PASS
Operators are often tempted to remove too much stock in one pass on the work. This causes the grinding wheel to break down too quickly, resulting in uneven wear and unsatisfactory finish.
[21]

FREE INSTRUCTIVE BOOK STILL AVAILABLE

Now in its third printing this Know How illustrated 64 page booklet has proved an invaluable aid to grinding departments. Both large and small users of grinding wheels welcome the informative contents of this comprehensive book.

New grinder hands find "Helpful Hints and Safety Suggestions" particularly useful.

Your entire grinding department will find its many concise facts constructively valuable.

Ask for sufficient copies to be placed in the hands of all interested in grinding.

INVEST IN WAR BONDS

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

Not all masterpieces are in art galleries . . .

. . . but this is how our grinding wheels would look there! 100% in Uncle Sam's service, our custom-made wheels, *speedily* developed through our controlled trial plan, will increase efficiency in your War Production. Write for our new catalog.

Universal Wheel & Abrasive Corp.

2626 West Van Buren Street • Chicago, Illinois

NUBON 24 HOUR PROCESS GRINDING WHEELS AND STONES

NICKEL AIDS THE AUTOMOTIVE INDUSTRY

to KEEP 'EM ROLLING!

Using ingenuity and "know-how" born of long experience, automotive engineers designed the phenomenally successful transport equipment that now speeds the United Nations on the road to Victory.

Built to take punishment far above peacetime requirements, these specialized military vehicles are being produced in quantity by the mass-production methods that have amazed the world. From North Africa to the South Pacific, these trucks, jeeps, tanks and half-tracks have repeatedly met wartime demands for stepped-up performance.

This kind of engineering-thinking pioneered the application of Nickel alloyed materials. Now, when uninterrupted operation is so vitally important, the continued and widespread use of Nickel is clear evidence of its many advantages.

In steering knuckles or differentials, in forged gears or cast blocks, a little Nickel goes a long way to provide essential dependability. It improves strength/weight ratios, increases wear and corrosion resistance, imparts toughness, and assures uniform properties of the other metals with which it is combined.

Today, maintenance crews on far-off battle fronts are learning what metallurgists and engineers here long have known . . . that, properly used, Nickel aids to "keep 'em rolling."

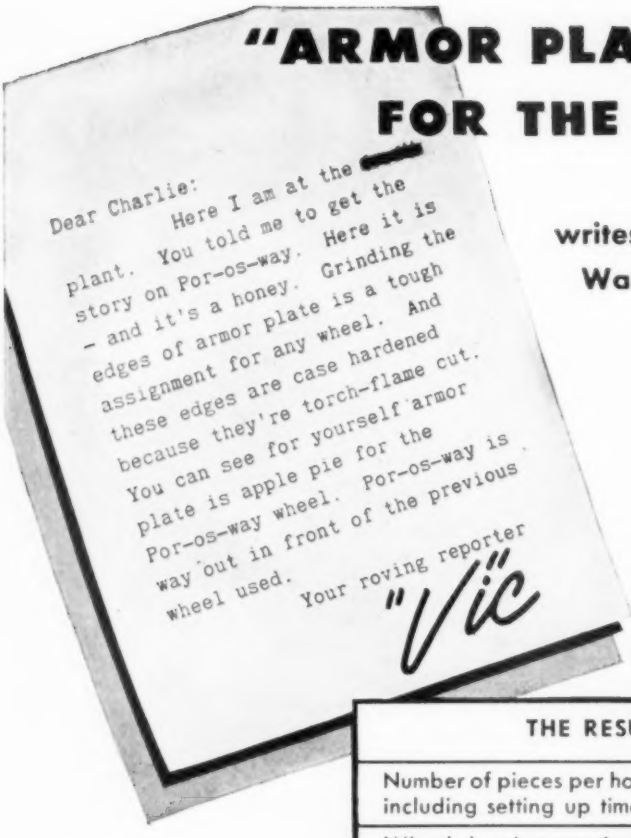
For years the technical staffs of International Nickel have been privileged to cooperate with automotive engineers and production men . . . men whose work is now so necessary to the Nation. Counsel, and printed data about the selection, fabrication and heat treatment of ferrous and non-ferrous metals is available upon request.

★ Nickel ★

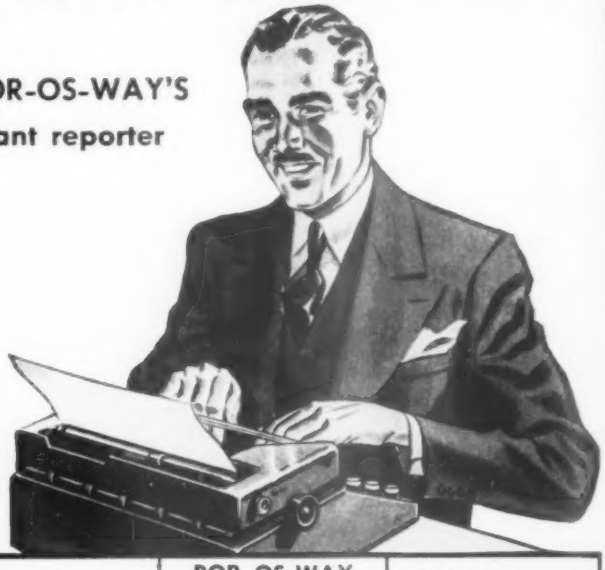
For lists of current publications, please address Technical Library Service

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York, N. Y.*

"ARMOR PLATE IS APPLE PIE FOR THE POR-OS-WAY WHEEL"


Dear Charlie:
Here I am at the plant. You told me to get the story on Por-os-way. Here it is – and it's a honey. Grinding the edges of armor plate is a tough assignment for any wheel. And these edges are case hardened because they're torch-flame cut. You can see for yourself armor plate is apple pie for the Por-os-way wheel. Por-os-way is way out in front of the previous wheel used.
Your roving reporter
"Vic"

writes POR-OS-WAY'S War Plant reporter



THE JOB:

Removing average of ¼" stock from all four edges of ½" and ¾" armor plates, consisting of mild steel one side, hardened steel (600 Brinnell, 35-37 Rockwell) on the other. Torch cutting case hardens the edges. Three Rogers grinders used.

THE WHEEL:

Por-os-way segments — 4⅛" x 1¼" x 4" A24KV2.

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent.

WRITE ***for complete booklet "Facts About Por-os-way". The address is 462 Wheatland St., Phoenixville, Penna.***

THE RESULTS	POR-OS-WAY WHEEL	FORMER WHEEL
Number of pieces per hour, 4 sides per piece including setting up time	5	2
Wheel dressing required	None	Every 6 or 7 pieces
Life of Wheel	4.5 days (108 hrs.)	½ day (12 hours)
Average depth of cut per pass	.008" to .125"	.006" maximum
Speed of removal for 30" of edge	2 minutes	20 minutes
Number of passes required	7	15
Time per pass	2½ seconds	4 seconds (wheel chipped at faster speeds)
Number of man-machine hours per month, 3 men on 3 machines; 8 hours, 3 shifts, 30 days per month	2160	
Number of pieces finished (4 sides) per month—including setting up time	10800*	4320
Monthly increase in production through use of Por-os-way Wheel	**6480** pieces	2½ times **more** than previously

*Por-os-way actually removed stock 10 times faster than previous wheel but inclusion of setting up time, being a proportionately large factor, reduces ratio to 5 to 2.

2 TO 5 TIMES MORE *WAR* PRODUCTION PER MAN PER MACHINE

POR-OS-WAY*

a new RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.

COPYRIGHT, 1943, A. P. de Sanno & Son, Inc.

CLEEREMAN
Jig Borers and Drilling Machines

A non-metallic spider reduces vibration by isolating the spindle from the transmission.

Freedom from Vibration

. . . a feature which contributes to the extreme precision of Cleereman Jig Borers!

Write today for the new *Cleereman* Jig Borer and Drilling Machine catalogs!

ARMY E NAVY

A *Cleereman* Jig borer equipped with micrometer head stop, rotary table, and power rapid traverse to table and carriage.

BRYANT MACHINERY & ENGINEERING COMPANY

Associated with **CLEEREMAN MACHINE TOOL COMPANY**

General Sales Offices 400 W. Madison St. • • Chicago • Ill. • U.S.A.

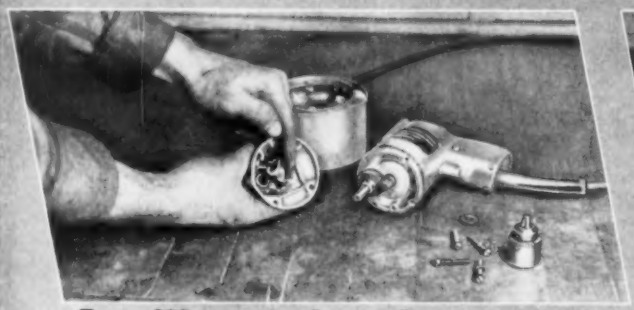
Two "Do's" and Two "Don'ts"

THAT HELP TO KEEP

CP UNIVERSAL TOOLS ON THE PRODUCTION LINE

CP Universal Electrics are distinctly production tools — designed and built for steady service on busy production lines. Many thousands of them are in continuous use in airplane plants and many other vital industries. But, sturdy though they are, CP Universals should not be abused, and should be given reasonable care. A few simple precautions like the four illustrated on this page will help you get maximum service from your CP 806 and 815 Drills and other CP Universal Electric Tools.

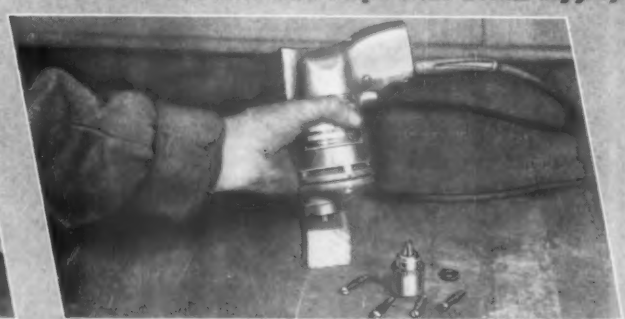
HOW TO GET MAXIMUM SERVICE FROM YOUR CP 806 AND 815 ELECTRIC DRILLS



Every 200 operating hours, clean gear case, inspect gears, repack with grease two-thirds full.

Inspect brushes every 200 operating hours. Blow out dust and chips from brush rigging.

Never clamp the housing of an electric tool. If you must use a vise, clamp the tool handle.



Never pry off gearcase cover with screw driver. Knock spindle on wood and cover will fall off.

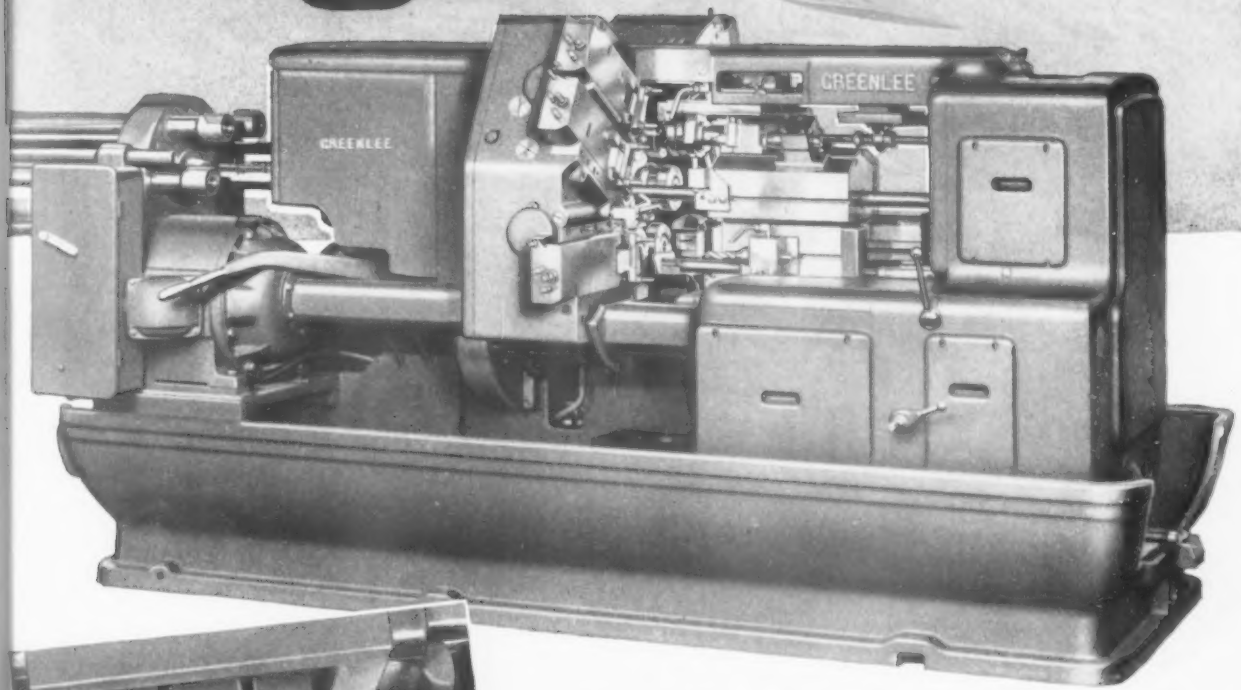
★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

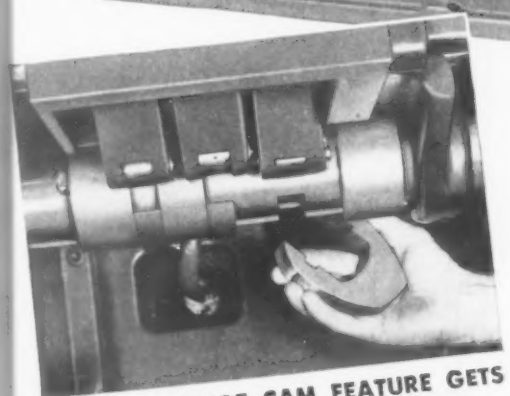
CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N.Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

GETTING THE JOB DONE *Faster!*

Greenlee 6-Spindle Automatics





QUICK-CHANGE CAM FEATURE GETS THE SET-UP JOB DONE FASTER

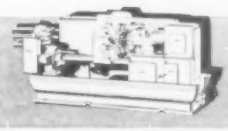
One of several reasons Greenlees can be set-up faster is shown here . . . the simple Forming Slide camming principle. These small, interchangeable slip-out cams, controlling the Forming Slides, are especially engineered for quick changing . . . eliminating special camming for each job.

★ In shops, homes, offices . . . on the seas, in the air . . . yes, and in every battle area, Americans and our Allies are today concentrating on *Getting the Job Done Faster!*

Shown here is the Greenlee 6-Spindle Automatic Screw Machine, hundreds of which are supplying the millions of parts needed for our fighting forces . . . needed to *Get the Job Done Faster* . . . needed to *win the battle of production,* the *war* and then the *peace* to follow. For this 3-fold purpose we are building Greenlees as fast as productive capacity permits.

GREENLEE BROS. & CO.

1947 MASON AVE. • ROCKFORD, ILL.

GREENLEE  *Automatic Screw Machines*

Buy Tools through your Industrial Distributor

AVOID the additional delays of deliveries over long distances.

AVOID plant slow-downs due to unexpectedly short shipments.

SAVE precious Tool-hours by using your distributor's spare parts and repair service.

PATHFINDER...through Blocked Supply Routes

Master of the strategy of supply, your Industrial Distributor can often do the "impossible" in speeding deliveries of tools and other vital equipment to your plant. His efficient organization has stepped up its manifold peacetime services to handle the formidable supply problems of an industry at war.

He has complete information on every source of supply at his fingertips, and can often by-pass barriers that appear insurmountable. The time he spends in tracking down the equipment you need is often all out of proportion to his profits, but he cheerfully works the extra hours, knowing he is helping you produce the goods that will win the war.

For Electric Tools, call your Stanley distributor and save time, save work. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

STANLEY

1843 TRADE MARK 1943

STANLEY *Electric* **TOOLS**

IN AIRCRAFT PRODUCTION

This Baker Machine Works on Exhaust and Intake Rocker Arms for Aircraft Engines.

Model 36-HO

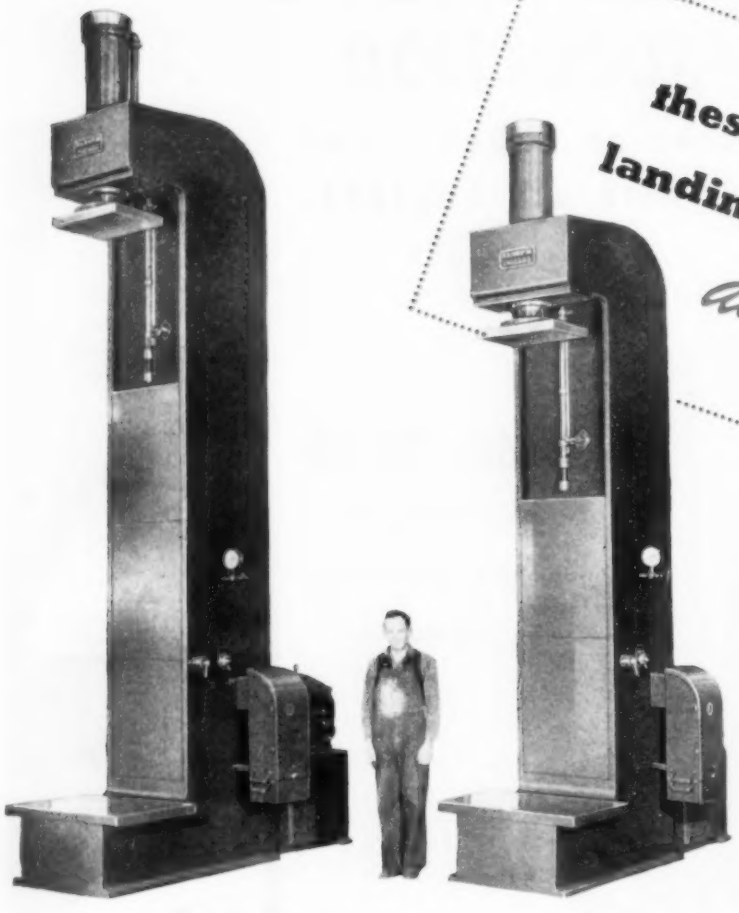
Write today for complete information on this machine

This vertical CLEANLINE heavy duty single and multiple spindle drill with hydraulic feed, is set up to drill, counterbore, rough, and finish ream. Used by the manufacturer of one of the leading aircraft engines, this machine takes part in the manufacture of exhaust and intake rocker arms. In this case, it is furnished with an 8-spindle, fixed center multiple head and the base with a 40 inch diameter shallow type ball bearing hand index table.

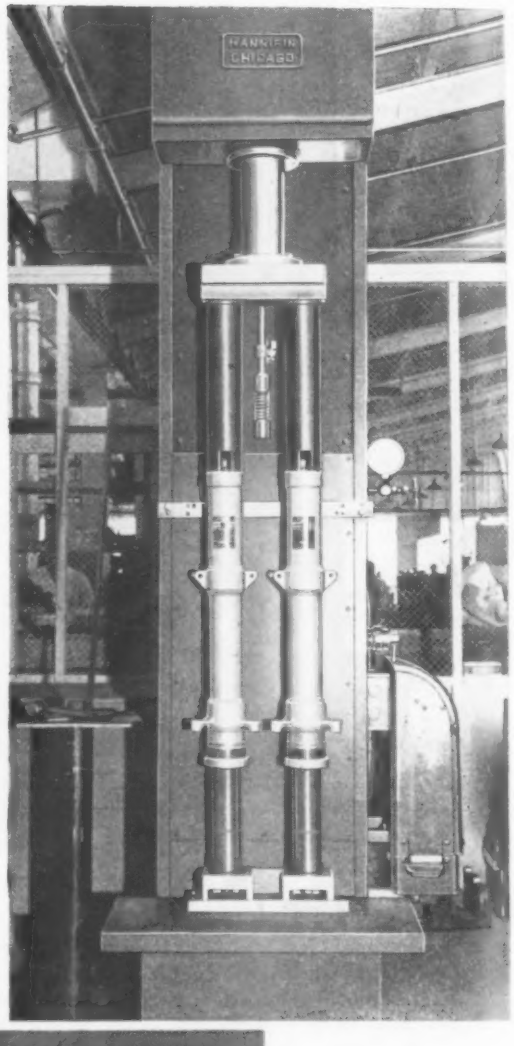
BAKER

BAKER BROTHERS, INC. TOLEDO, OHIO, U.S.A.

DRILLING • BORING • TAPPING • CONTOUR GRINDING MACHINES



these presses make landing gear testing *automatic*



Rigid testing and run-in of airplane landing gear shock absorbers is a fast, easily handled operation on these specially designed Hannifin hydraulic presses. With landing gear strut assemblies in place, the press ram operates continuously, compressing and releasing the shock absorbers as in actual service. Length of ram stroke and maximum pressure are adjustable, with maximum operation approximately 20 cycles per minute. Any required testing action is readily obtained.

This type of hydraulic press is but one example of Hannifin design to meet present day needs of efficient production. Hannifin presses are being used for straightening, forming, press-assembly, and similar purposes by makers of aircraft, military vehicles, machine tools, light and heavy ordnance, and other essential equipment. Hannifin hydraulic presses are built in many standard types, capacities 5 tons to 200 tons, and can be readily furnished with modifications in reach, gap, stroke, and table design to meet individual needs. Hannifin engineers will gladly furnish specific recommendations on equipment to meet your needs.

HANNIFIN MANUFACTURING CO.
621-631 S. Kolmar Ave. · Chicago 24, Ill.

Detroit Representative: R. A. BEAN, Hayward Building, 4829 Woodward Avenue
Telephone Columbia 4949

HANNIFIN
***Hydraulic* PRESSES**

Hannifin 20-ton hydraulic press used for testing landing gear struts and shock absorbers at a plant of the Menasco Manufacturing Company.

PRODUCTION PERSPECTIVES

T.M. REG. U.S. PAT. OFF.

Production: Differing with WPB on production figures, the War Department grabbed headlines by announcing that production for Army Ground Forces fell five and one-half per cent below requirements for May, three and one-half per cent below April output. WPB replied that overall arms production rose two per cent in May, that Ground Force material, representing one-sixth of total output, is in the area where largest deliberate "cut backs" were ordered. Tentative two per cent gain in May compared with seven per cent rise in April output substantiates belief that gains will be increasingly hard to achieve.

Aircraft: Continuing its dramatic rise, May output reached an unprecedented 7,200 planes with a total airframe weight of 60,000,000 pounds. June production was still higher. Total consumption of maximum available material for planes is still some distance off. Best aircraft production-increase story is at Ford's Willow Run (See Page 127)....Ships: With shortages of propulsion equipment, valves and instruments easing, output is rising. May deliveries totaled 175 vessels, bringing the year's total to 711, only 35 less than 1942's total output....Automobile Industry: Production for war in 1,500 widely scattered plants has doubled in the last 12 months, is now double the highest peacetime level and exceeds $1,000,000 an hour. Automobile industry employment has passed the 1,250,000 mark....Canada: Facilities and techniques developed in its booming war industries should place this country in a favorable competitive position to supply its own post-war mass production demands. Capsule review of Dominion accomplishments: 900,000 workers, 500 ships, 8,000 aircraft, 475,000 motor transport and 24,000 combat vehicles, and 55,000 heavy guns.

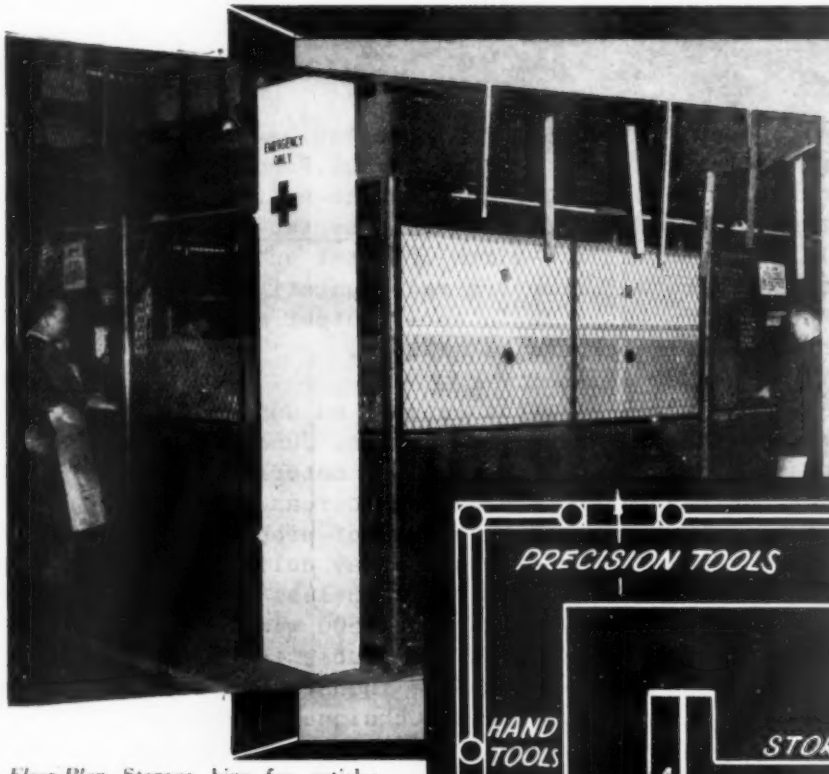
Materials: Don't construe the release of 300,000 tons of carbon steel for farm machinery (18,600 harvesters) as an indication that civilian production will "get a break". The Armed Forces are insisting on increased steel output for their own use....The Bureau of Mines is pushing its sponge iron projects. Its most important pilot plant (Laramie, Wyoming) is near completion. Successful production is yet to be achieved....Look for a serious shortage in lead. ...Iron ore shipments from Upper Great Lakes are still 8,000,000 tons behind requirements for the season....Use of N. E. Steels is rising. Output in May was 270,000 tons compared with June 1942 production of only 40,000 tons. Some consumers plan to continue the use of certain N. E. types after the war.

Machine Tools: With the backlog of orders down to about $600,000,000, the trade is thinking more about foreign shipments. At least one-third of current output of $120,000,000 monthly is going overseas, with the greatest proportion to Russia....Some firms are renegotiating war contracts now....Lend-Lease machinery shipments in April were $47,000,000, rose to $61,000,000 in May.

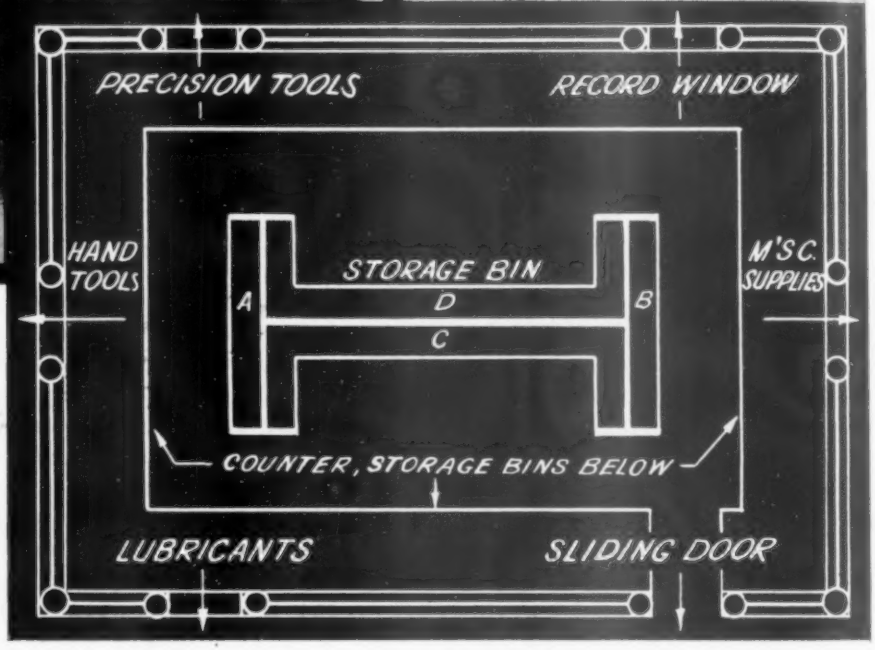
Manpower: More women in shops is inevitable, but government agencies present conflicting reports on their rate of employment. Gist of War Manpower Commission view: Hiring of women is "exactly balancing" loss of men. Office of War Information says: "In January-February 400,000 men left the labor force ...only 300,000 women were added. The Census Bureau reported that in April the number of women in non-agricultural jobs dropped by 200,000"....Absenteeism: War plants without systematic plans for reducing this production-thief have absentee rates nearly twice as high as those utilizing such programs.

LAST-MINUTE NEWS REVIEW OF MASS MANUFACTURING

More Windows IN YOUR TOOL CRIB



This photograph shows 2 of the 5 windows in the Tool Crib of the Jig Shop at Republic Aviation Corp., Farmingdale, N. Y., plan of which is shown below.



Floor Plan. Storage bins for articles served at each window are under delivery counter. Note "record window," used for starting employees, assigning checks, releases, transfers.

Suggested Plan for Reserve Storage Bin

"A" *Hand Tools:* Drills, rivet sets, counterbores, mallets, files, etc.

"B" *Supplies:* Emery and sand paper, tapes, gloves, towels, etc.

"C" *Containers:* For carbon tet., kerosene, mineral spirits.

"D" *Precision tools:* Height gages, levels, transits, calipers, micrometers, angle plates, etc.

LESS *Waiting Time* FOR YOUR MEN

HERE's a tool crib with five windows — one for every class of tools and supplies. It's big, but the management finds that it pays big returns — by reducing waiting time for men and "down" time for machines.

Your layout may not need to be so elaborate; but careful planning of your tool crib to assure free movement and systematic order always results in longer life and more effective use of your tools.

GTD GREENFIELD

TAPS · · · DIES · · · GAGES · · · TWIST DRILLS · · · SCREW PLATES

ARMY E NAVY

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS

DETROIT PLANT: 5850 Second Blvd.

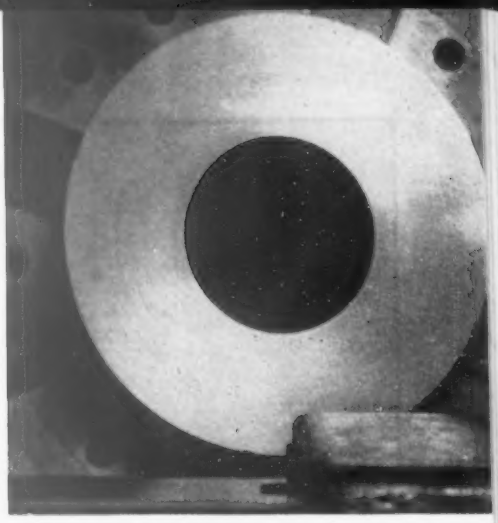
WAREHOUSES in New York, Chicago, and Los Angeles

In Canada: GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

Tool Conservation Begins in the Tool Crib

Wood Pack Reamer Finishes Contour

The first prime contractor on the 90 mm. gun, the Wheland Company of Chattanooga, organized a mass production process used by others today. The job of finishing contours on the powder chamber resulted in a tooling development.



Breech end of tube showing the powder chamber on the important 90 mm. gun.

GERALD ELDRIDGE STEDMAN

"WHAT are you grinding down to, Pete?" W. H. Wilson, manager of The Wheland Company's Chattanooga gun division asked, as we stopped before the tool machining on the wood pack reamer, important to the bore and finish of the powder chamber on the 90 mm. gun. "Grinding absolute, Bill, absolute. That's how we're getting inside that plus and minus .002" tolerance on the chamber reaming."

The wood pack reamer for finish operations on the 90 mm. powder chamber is a beautiful piece of work, so excellently constructed by Wheland toolmakers that among a lot of 25 of them, completed last September, the majority were still in use in May.

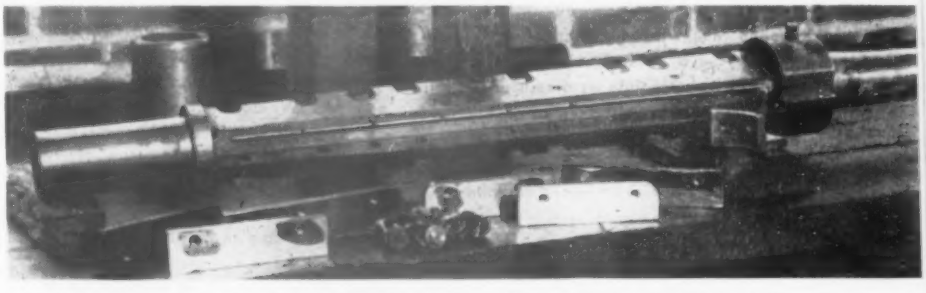
Components of the 90 mm. gun

First prime contractor of this gun, The Wheland Company has had all the grief and is worthy of much of the glory for organizing the mass production processing on this combat item. Behind this achievement is C. W. Wheland, vice-president in charge of manufacturing, whose dynamic abilities massed together many Watervliet Arsenal blueprints early in 1940, gained the loan of a lot of nondescript Arsenal machine tools and risked the company's future on an educational order for these 90 mm. guns. The resulting organization has established processing procedure which far larger companies, later in the field, have adopted as their standard practice.

The 90 mm. gun consists primarily of (1) breech ring, (2) breech block, (3) gun rails, (4) supports, (5) internal components such as cranks, extractors, firing pins, sear, cocking lever and (6) the tube or barrel with its powder chamber, and which requires the wood pack reamer as its finishing touch. Altogether, there are 93 parts to the 90 mm. gun, the major share of which are machined at the Wheland plant.

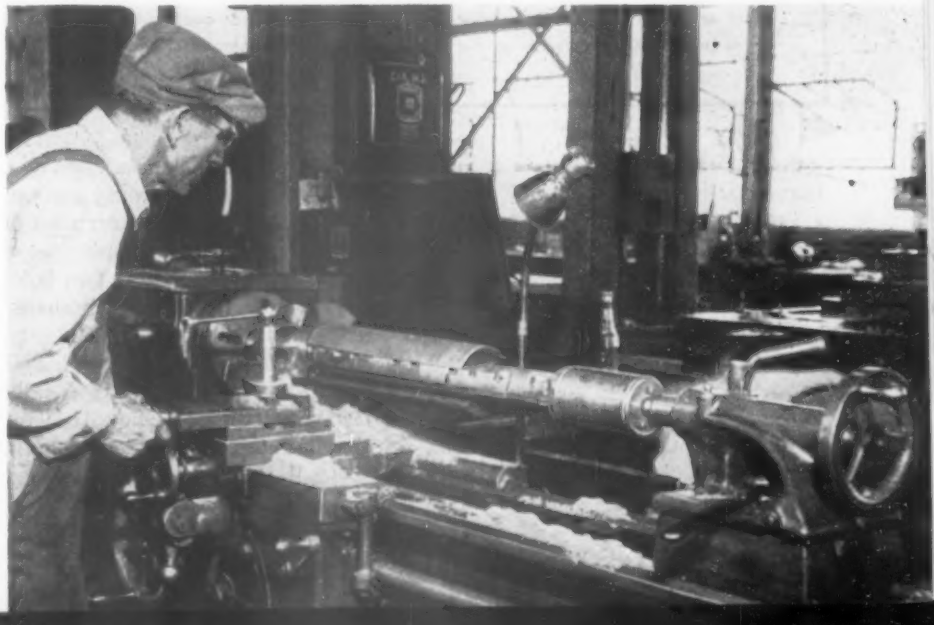
The powder chamber of the 90 mm. gun is dimensioned 25¾" as to length. The tube, of which the powder chamber is the breech end, is received as a rough forging weighing 2111 pounds. In a sequence of 15 operations it is refined to a finish weight of 1465 pounds. Preliminary work on the powder chamber is performed on a lathe, equipped with a profile attachment of Wheland design. This attachment causes the tool to follow the outline of four slopes or zones, leaving about .030" to be removed by the wood packer reamer.

Principally, the reamer consists of



Body and parts of powder chamber reamer. Note copper coolant tube.

Wood pack being turned to size.



C. W. Wheland, vice president in charge of production, James Weldon, reamer builder, and Bill Wilson, manager.

MEN WHO MAKE MACHINES

● THE Wheland Company has a proud Southern record in manufacturing drilling equipment, woodworking machinery and special contract production of heavy machinery. It is doing massive work in anchor windlasses having a bore and stroke of 10" by 10". Interestingly, one recent job consisted of making repairs on a 72-tooth, 67" diameter gear for a 4 A windlass as a rush order, this exact part having been originally produced by Wheland during World War I. The company's production of drilling equipment and heavy machinery is spotted in enduring service throughout the world. But its greatest achievement is the production of 90 mm. guns.

While at the Watervliet Arsenal, wrestling with this know-how, C. W. Wheland was thrown into contact with James H. Weldon, who had spent 50 years at the Arsenal as toolmaker on all sorts of ordnance, such as the 37 mm. to the 16" mortar, the latter a coast defense weapon, as well as the 8", 10", 12", 16" naval guns, and had had much to do with the 3" anti-aircraft gun which afterwards became the 75 mm. by reducing its bore.

This Arsenal is the Ordnance Department's Army Service Forces laboratory for this type of armament development, and Mr. Weldon worked patiently in its affairs all his life until he retired in 1931. Mr. Wheland induced him into service again, at 71 years of age. Weldon's toolmaking talent has been the guiding light in the development of the wood pack reamer, which, of the many tools, seems most applicable in the production of this important 90 mm. gun that has performed so excellently on the Tunisian front. Known as "Uncle Jimmy" to all the men of the plant, Mr. Weldon has already contributed enough to victory to command citation.

a body, two sets of properly turned, impregnated wood blocks or "packs" (they act as follower guides) and an ingenious coolant distributing system whose flow is directed through copper tubing disposed along the length of the tool. The blades of the reamer conform with the contour of the powder chamber and tend to shape to the profiling of the shell. The steel body of the reamer is forged and entirely machined in the Wheland plant.

The reamer body consists of a shank with a drift hole, blades on each side matching the reaming contour of the powder chamber, with a set of two oil-impregnated maple wood packs bolted to this body. Two holes are accurately drilled in the shank, their terminals coupled to the copper tubes in the reamer body. This copper tube is drilled at six equally spaced intervals, feeding coolant throughout the entire blade length. Pressure is 150 psi., lubricant being a mineral oil-lard-kerosene mix of Wheland composition. The pressure used has been found correct to flush away the remaining chips.

A shank, a body of four zones, and a bronze pilot are involved in this tool. The body's zone dimensions in terminal length are steps of 17⅝", 21⅛", 24¼", and finally 25¾". From the shank end, the tool's diametrical width (which, in its turning use would comprise the travel of its diameter) is 4.706" at the shank, 4.415" at the contour terminal of the first zone, and thereafter, 3.677" to 3.677" in the constancy of dimensions of its third zone, to 3.543" at its fourth and final step.

Purpose of the wood pack

The ¼" copper tubing follows a groove milled into the entire length of the reamer body, which, connected with the two ports through the reamer shank, permits oil to lubricate the blades through the six 3/32" holes described above. The wood pack is installed on the two sides of the body in the first 17⅝" tool zone.

The set of maple woods per tool act as a guide for the tool blades; they steady the tool and prevent chattering and runouts. They are turned .002" oversize to the bore dimension to provide resilient adaptability.

The hard maple wood for these packs is oil impregnated. After rough working in the Wheland carpenter shop, they are placed in a special steel tank of 100 gallon capacity. A 50-pound paraffin additive is mixed with the soaking oil. These woods are soaked in this mix 30 to 40 hours at a temperature of 250° F. until the maple, completely impregnated, sinks to the tank bottom. This complete oil saturation is maintained during all stages of the wood's use. A standby drum of the mix with a dozen or more prepared woods is maintained in the reamer department to be drawn upon as needed.

Fitting the woods

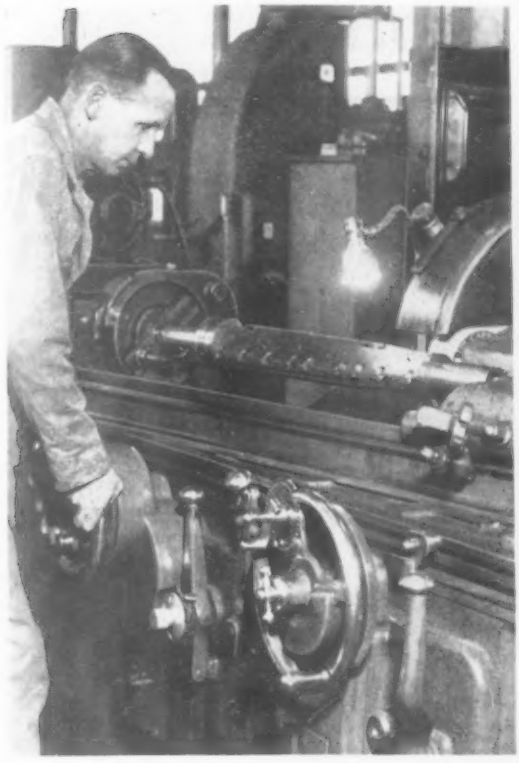
The woods are fitted in pairs to the steel body of the tool, planed to the individual body and fastened by a ⅜" bolt. They are finish-turned on the tool body so that no distortion can occur, and kept at complete saturation by standby soakings. There is no perceptible shrinkage of these woods.

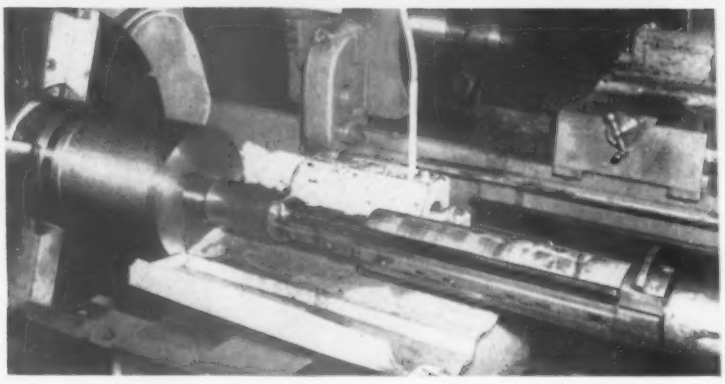
The Wheland wood packed reamer has two cutting edges, or blades. After

Right: **Inserting reamer in bar of reaming lathe.**

●

Below: **Grinding reamer blades.**



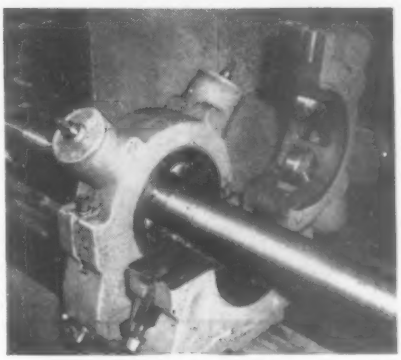


Pilot in the process of entering the tube of 90 mm. gun.

the body of the tool is completed, the blades, consisting of high-speed "Vanite" or "Molite" tool steel, are applied to the reamer body. The blades are made in three or four sections to each side, shaped to templates, drilled, tapped and fitted to the body of the reamer, then removed, heat treated and hardened to 62 Rockwell "C", and secured to the tool body by ⅜" screws. They are ground to size on the body after installation. The blades are 7/16" thick, and grooved with a lip. Naturally, the blades wear, get thinner from regrinding. After each grind, they are honed razor-sharp.

Wood pack is oversize

Bear in mind that the performance of this tool depends upon the oversize wood pack which prevents vibration. There is the physical principle of resiliency involved here . . . similar to the principle of using rubber to line sandblast nozzles. Anchoring this tool in the bore with steel for the reaming operation would be impossible because of the clash of metal to metal. Wood, completely saturated, adapts itself to the strains without friction, and has the braking effect necessary to absorb vibration and eliminate chatter.



Muzzle end of tube in roller steady rest.

The shank of the Wheland wood packed reamer is inserted into the boring bar, which in turn is held in place by the carriage of the lathe, and is fed with predetermined feeds and speeds. The machine tool employed is the LeBlond 30" lathe, specially built to Wheland specifications for this war job.

The breech end of the tube is checked in a regular, roller-bearing design chuck. The muzzle end of the tube rotates in roller steady-rests. Thus held in the chuck, the tube revolves at three speeds: 8 rpm. in roughing, 6 rpm. in intermediate cut, and 4 rpm. to finish. The wood pack reamer, which does not revolve in the finishing operation is fed horizontally into this bore with speeds corresponding to spindle revolutions: .008" for the 8 rpm. roughing, .004" for the 6 rpm. and .002" for the 4 rpm. finish.

A 16 hp. motor with V-belt drive provides the variable speed. The hollow spindle, taking the breech end of the tube, greatly facilitates the operation. The time required to ream the powder chamber of the 90 mm. gun with this tool is between two and three hours. Roughing takes two hours.

In the repair of this tool, 20 gage sheet steel is used to reform the wood packer diameters. This permits a set of woods per tool to be shimmed out .030" on diameter. A set of woods has an ordinary life of four weeks on this precision machining job.

In the design, making and repair of this wood pack reamer in original practice and established procedure of The Wheland Company, has set some new standards.

THE END.

PRECISION GAGING with Air Pressure

Multiple station gage checking five points.

At the rate of 3000 parts per hour, this gage checks diameters on an ammunition component.

Note separate pressure gages just above operator's hand which indicates accuracy of each dimension.

General Motors photos and drawings

A. D. KALTER
MORAINE PRODUCTS DIVISION
GENERAL MOTORS CORPORATION

MORAINE Products Division is using an air pressure method of checking both internal and external diameters for all types of size or distortion errors. Speed, sensitivity and low cost of tools are its chief advantages. In measuring internal diameters, this is done by means of a straight plug ground and lapped to the low limit of the bore to be checked. The plug is grooved and drilled to allow a metered flow of air between the plug and the bore diameter. As the diameter varies, the difference in air pressure is shown on a pressure gage.

The same principle is used in checking outside diameters, but the gage is a little more complicated because of the means necessary to introduce air into the groove of the gaging ring. Though this method of gaging is highly sensitive, no unusual accuracy need be built into the gages, nor is there any considerable wear on their surfaces. The important factor is the flow of air between gage and work, and the correct amount of flow or back pressure created in gaging a workpiece of accurate dimensions is determined by reference to a master ring or plug gage.

Of primary importance is the high production rate. One set-up recently developed provides for multiple-station, hopper feed air gaging which will check five different points along the diameter, plus one length, of an ammunition component. This is done at the almost unbelievable speed of 3000 parts per hour. Less dramatic perhaps, but worth noting for any long run operation is the fact that the average check takes less time than a "go" and "no go" plug gaging operation. Nor need a production job be of particularly long run to pay for such an installation.

Most of an installation may be set up by a plumber. And the cost of building the gaging members is small in contrast to the average precision internal or external comparator. The

By measuring the flow of air between gage and workpiece, I.D. and O.D. can be checked with unusual accuracy. Low installation cost and speed are among prime factors. As many as 3000 parts per hour are checked for five dimensions.

only replacements necessary are new or chrome plated and reground gaging members. When the air gages were introduced at Delco Products Division, one of their initial accomplishments was in the manufacture of shock absorbers. Inspection cost was reduced about one-fourth, and the rejection of finished assemblies was lowered from 17 per cent to three per cent. As the use has been continued in other divisions, cost and rejection figures have been lowered in the manufacture of war products.

Perhaps the most amazing feature of the air gage inspection method is that as the limit on a part being checked is reduced, sensitivity is increased. On a pressure reading, as high as 15 pounds difference has been indicated when checking a total tolerance of .0005". However, this is a wider reading than necessary. In fact, the customary practice is to set up the gages to obtain five to 10 pounds range on limits from .0002" to .0005"; then when wider limits are specified, ranges of from 10 to 15 pounds are available.

From this, it can be appreciated that on close limit work, gages can give a reading of two to three pounds for each .0001", where on wider limits they may go to one pound per .001".

Air Gage Hookup

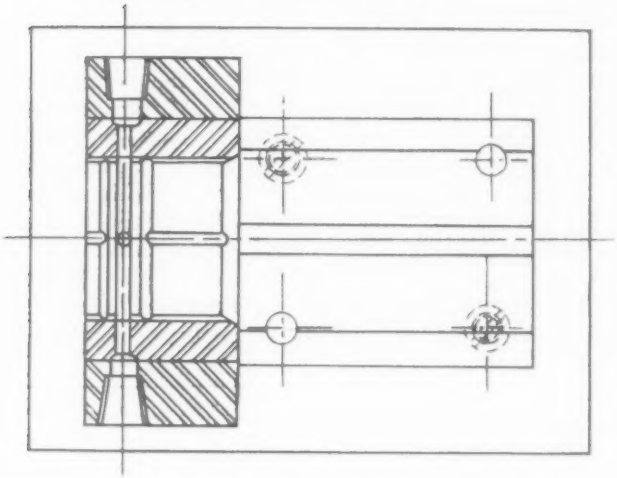
Following the air line from the source, the first step in the installation as shown of Figure 1 is a shut-off valve to facilitate the changing of pressure gages and gaging members. Second is a line pressure regulator to maintain a constant pressure in the hookup. Third is a water filter. Fourth is an air pressure gage of 100 pounds capacity, for setting and checking the line pressure regulator. Fifth is a needle valve for metering the flow of air into the gaging member so that it is only slightly greater than the flow through the area between the diameter of the low limit gaging member and the high limit set ring. Sixth is an air pressure gage of 30 pounds capacity, which registers the variations in size in terms of pressure. This has a check valve arrangement to dampen the action of the indicator, prolonging its life. Seventh and last is the gaging member.

The Gaging Member

The gaging member, Figures 2 and 2a, is straight, ground and lapped, and

Right: **FIGURE 1. Air connection for internal gage.**

Below: **FIGURE 2. External gage, showing method of introducing air.**



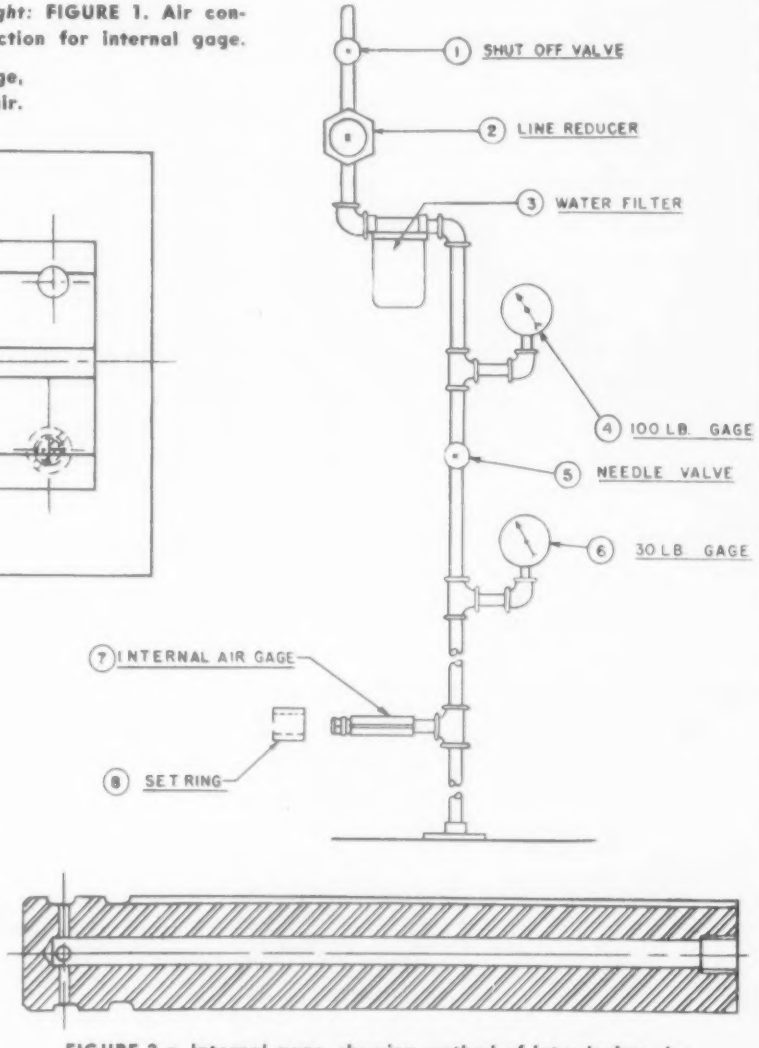
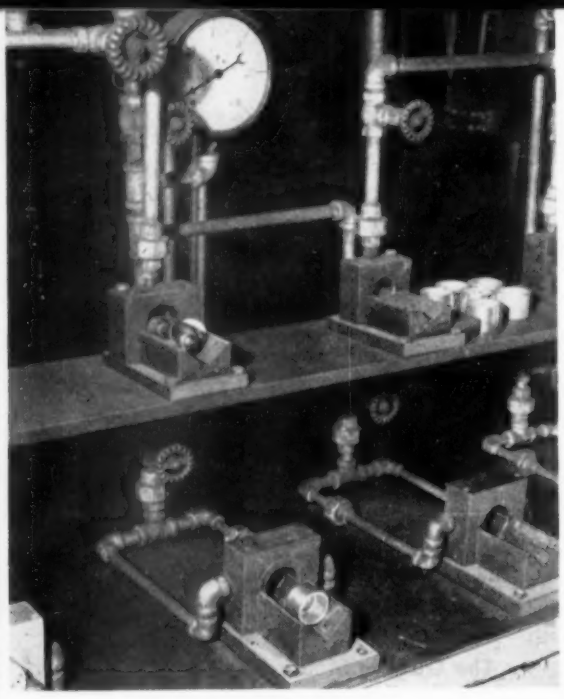


FIGURE 2-a. Internal gage, showing method of introducing air.



External air gages used for checking O.D. of cylindrical surfaces.

Except for increased complexity of compressed air hook-up, installation and operation is same as for plug type internal air gage.

These gages are checked with a master plug gage which determines the amount of air which will escape between the air gage and a part of a given O.D.

is made to the low or high limit of the bore size, depending upon whether it is a plug or ring. Because the same principle is applied for both types, the plug gage will be dealt with here. The external gage differs only in that introduction of the air is a little more complicated.

It is drilled as shown to allow the air to flow out from the groove in both directions along the bore. The plug also has grooves to allow the air to escape without further restriction after it has passed along the bore for a short distance, usually from 1/16" to ¼". This short restriction gives a more sensitive reading and provides a means of localizing the check to the area close to the air groove as it passes along the bore.

Air Gage Operation

The first step in the operation is to close the needle valve and open the shut-off valve. Then the line pressure regulator is set to a pressure, as shown on the pressure gage, of 30 pounds. This may be changed to meet special conditions, but the pressure established for a given operation should be maintained to avoid any difference in two gages on the same operation.

A set ring made to the high limit of the bore size to be checked is placed over the plug gaging member. With the ring covering the air groove, the needle valve is opened until the pressure built up in the line between the valve and the gage shows 10 pounds on the pressure gage. This drop of 20 pounds from the set pressure of 30 pounds is caused by the flow of air out between the plug and the ring.

The gage is now ready for production use. The parts to be checked are passed on an off the gage plug, and the pressure on the 30 pound gage is read.

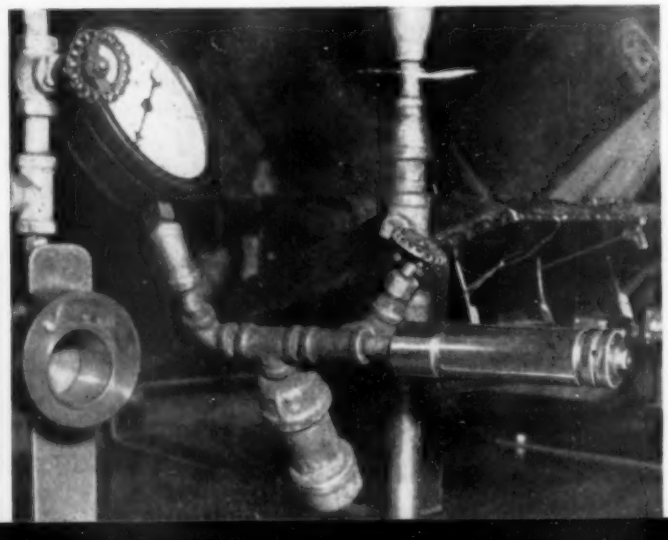
If the plug enters the required distance, the bore is known to be above the low limit, and if the pressure reads above the set pressure of 10 pounds at all points along the bore while it is passing over the air groove, it is known to be under the high limit.

Bores which show a reading under 10 pounds are rejected as oversize, and of course, those which will not go on to the gage are rejected as undersize.

Commercial comparators usually have two or three points of gaging contact. A two-point check will indicate one type of out-of-round condition, whereas a three-point check will indicate another type. An air gage, however, will show the actual area of the bore at any point along the bore. In other words, the air test will reject any bore which has any out-of-round, oversize or rough condition which adds up to a greater area than that represented by the high limit of the bore. And since the air plug gage is a straight cylinder, made to the low limit, any bore which has any combination of undersize, crookedness, or out-of-round which prevents the plug from entering the required distance, will be rejected.

From the above, it can be seen that almost any dimensional error which would affect the functioning of the bore would be found by use of the air gage and at a much lower cost than by other methods.

This method can be used in any bore which has ¼" or longer of full diameter wall, unbroken by holes, slots, or grooves. It can, in some cases, be applied to bores which have greater broken area, by using special designs of gages. It would be difficult to apply to holes having spiral oil grooves, or a great number of holes entering at different angles. THE END.



Plug type air gage used for checking precise internal diameters.

Note the groove with aperture for air escaping under pressure. Flow of air between part and gage is measured in terms of resistance to known pressure.

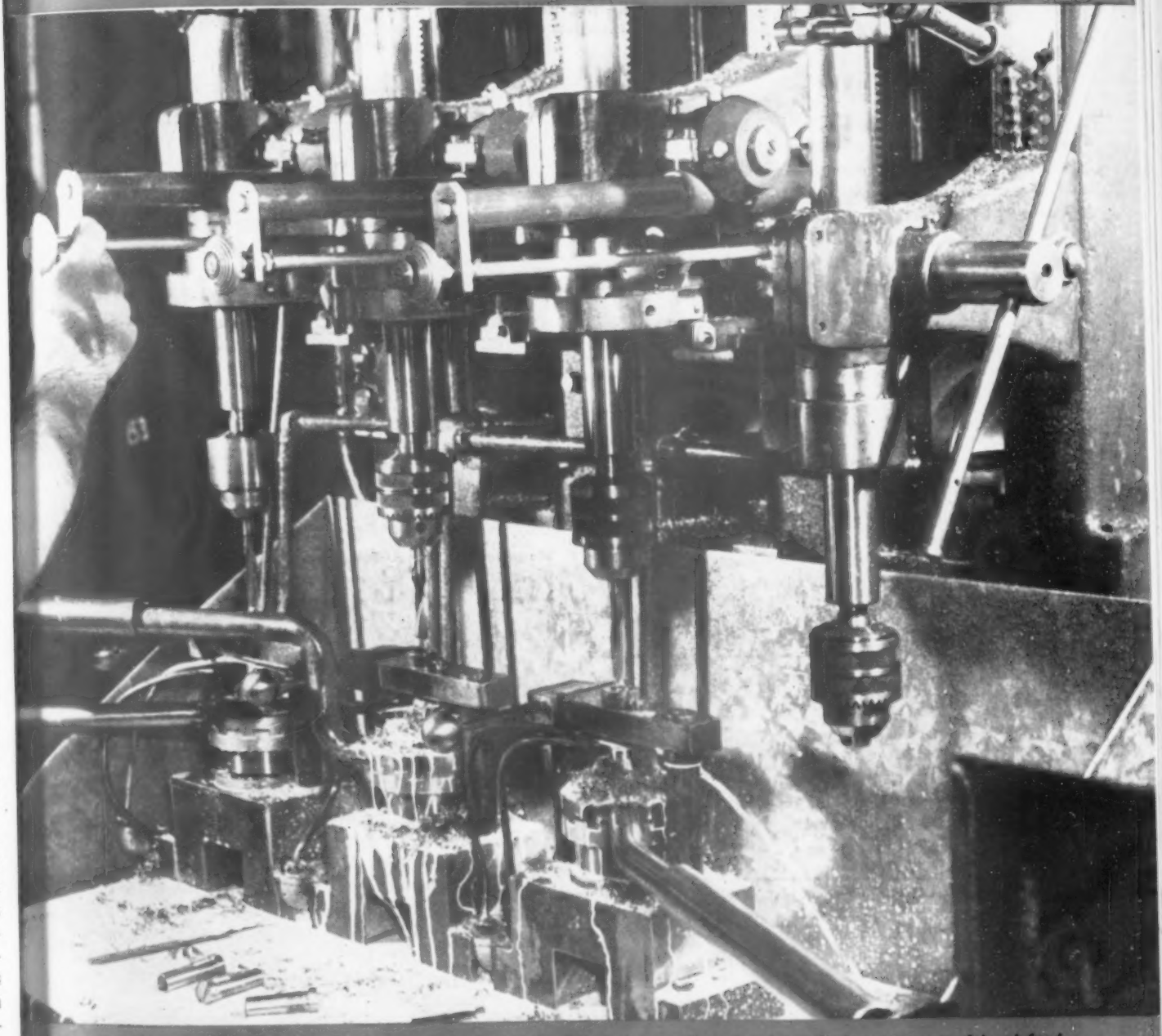
Plug checks for undersize. Air flow measures size over low limit.

Live Center Set-Up Reduces Scrap

Galling or deep scratching during a precision thread grinding operation on aircraft parts at the N. A. Woodworth Company, Ferndale, Michigan, was overcome by installation of a live center. Emery in the coolant had rubbed between dead centers and a highly polished 9/32" spherical radius hole. The result was to upset close tolerances on the threads which were ground concentric with the hole. A special live center, designed in collaboration with the Sturdimatic Tool Company, revolving with the part, stopped movement between surface and center, eliminating friction with the emery.

PRODUCTION

MACHINE AND TOOL ENGINEERING



Pneumatic feed for 4-spindle drill press stepped up loading and unloading time by relieving operator of hand feed.

BEGINNING A NEW FEATURE • *Streamlined Production*, designed to aid war production engineers in conserving man-power, vital materials and critical machine time. This first article presents a cross-section of broadly applicable operations which have effected production savings for National Cash Register Company.

Streamlined PRODUCTION

Improved War Tooling

A cross-section of methods which have resulted in production advancement by the National Cash Register Company. Improved practice has conserved men, materials and machines—and produced better products.

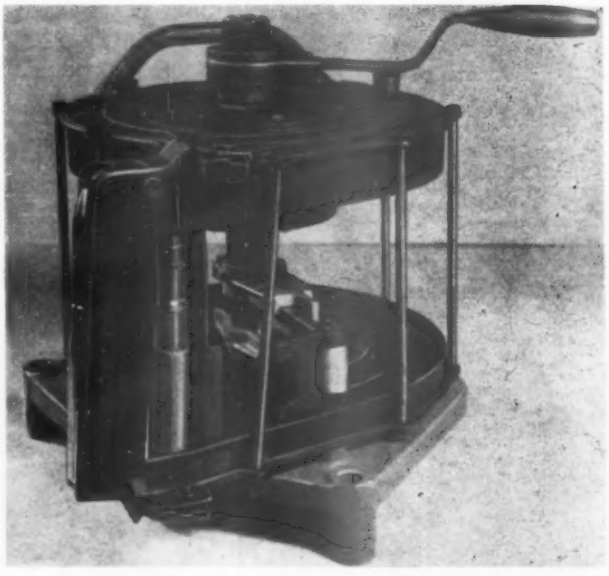
JEROME WILFORD
ASSOCIATE EDITOR

THE STORY of how war production started is well known. In terms of weeks and days, men and machines were converted to the job of building guns, planes, tanks and ships. There wasn't time to search for the most efficient methods nor time to design special equipment. The result was an achievement, to be sure, but everyone knew that the result was not the best that could be done.

There was a period of producing, almost regardless of cost or method, contractors and sub-contractors taking guidance from practice of previous manufacturers, such as in Great Britain or government arsenals.

When the National Cash Register Company in Dayton, Ohio undertook to manufacture the magazine for the 20-mm. Oerlikon anti-aircraft gun, they received approved prints and manufacturing specifications. In some instances, they were able to suggest improvements immediately, but for the most part, getting the job under way did not allow for much change. The first phase of their production was based on previously tested methods.

Changes, or production advancements, have been based largely on two factors: (1) improved production practice by application of more efficient methods; (2) conservation of material by change in product design, specification or production method.



Magazine for 20 mm. Oerlikon anti-aircraft gun. Curved white lines inside lower side plate indicate walls of spiral channel which are copper brazed to the plate.

FABRICATING A SPIRAL CHANNEL

1. 239 special groove cutting machines.
2. 24½ tons of metal per month.
3. 65,000 man-hours per month.

Saved by STREAMLINED PRODUCTION.

THE BEST WAY of studying NCR's production advancement is by consideration of methods. Side plates for the drum shaped magazine have a spiral groove approximately 1-32″ wide which receives a spiral-formed steel strip, approximately 1½″ wide. Thus a channel is formed from the center of the magazine to the mouthpiece, for guiding one end of the shells as they are fed by spring power into the gun.

Original specifications called for milling the groove, with an end mill into soft, cold-rolled SAE 1010. Holes were then drilled through the groove, about 3″ apart, and the spiral strip was inserted in the groove and spot welded from beneath the plate through the holes. Not the least of the disadvantages of this method was that side plate and spiral strips were not too difficult to break apart. As far as production was concerned, the grooving operation alone required about 1½ man-hours and 239 special groove cutting machines.

NCR engineers changed this fabrication method almost completely. First, they decided to stamp the grooves into the plate, and designed a coining die, so that one hydraulic punch press produced the entire output. This had a further advantage in that stamping the groove on one side of the plate left a reinforcing ridge on the other side so that weight could be reduced. Plate thickness was reduced from .138″ to .125″—24½ tons of metal saved per month.

Next, the method of joining the spiral strip to the grooved plate was changed. Welding was consuming man-hours. So the engineers decided to braze. Small clips of copper wire are laid along the top of the strip. Coiled, it is placed in position in the grooved side-plate. Laid

a conveyor belt, it was passed through a brazing oven at 2400° F. The copper ran down the side of the strip, into the groove at the junction of strip and side plate and formed a continuous brazed joint.

In addition to other savings, 65,000 man-hours were conserved monthly on this completely revamped operation.

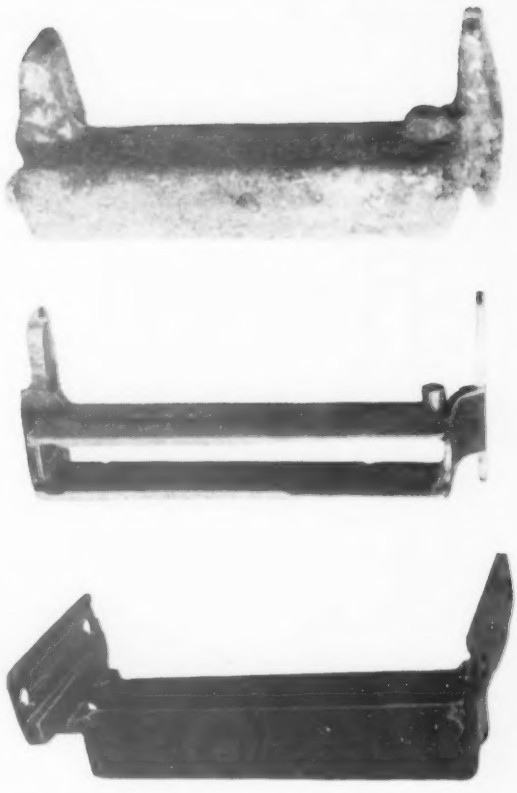
THREE PRODUCTION FIXTURES

1. Six 4-spindle drill presses.
2. 20 milling machines.
3. 41,000 man-hours per month.

Saved by *STREAMLINED PRODUCTION*.

THE SHELL is ejected into the gun from the magazine through a slotted machined forging, known as the mouthpiece. Originally milled two at a time, NCR flame cut the slot in the forging, using a cam feed to control the operation. Two power mills and 1050 man-hours per month were saved. The scrap cut-out is heated, reforged to size and machined to produce several ratchel pawls per blank. Three punch presses are used to make this part which previously was made from square edge stock on six milling machines.

Further operation on the mouthpiece consists of broaching several surfaces. Two broaching machines perform the operations previously done on 18 milling machines. Each broaching operation is performed in lots of 5,000 and semi-finished parts are stored on a conveyor between tool changes on the broaches. Total man-hour



Starting at top are rough and finished forgings of mouthpiece for the 20 mm. Oerlikon gun. The finish machined product is third part shown.

Slot in mouthpiece forging is flame cut, using a cam feed to control the operation. This replaced 2 power mills.

Flame cutting tubing for the spring casing was third in method changes which resulted in streamlined production.

cut by a broaching die in two steps. Clamped to the bed of a punch press, the tube was slotted on each side by parallel broaches. Turned 90°, the tubing was fed along the bed the length of the desired finished piece so that on the next stroke a wedge shaped broach with teeth on each side entered the slots and finished the cut. Each stroke produced a finished cut length of tubing in that both operations are simultaneous.

This operation has been superseded by a flame cutting fixture. The part is chucked in the head of an old engine lathe, and four oxy-acetylene flames produce as many finished lengths of tubing simultaneously.

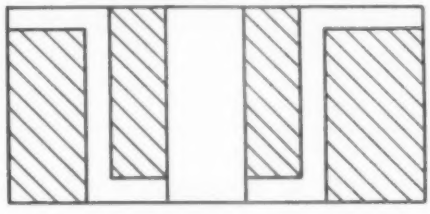
Including the blanking of the flanges which are brazed to the tubing, five old punch presses and nine old lathes relieved 11 critical screw machines and conserved 1575 man-hours per month.

CUTTING TUBING

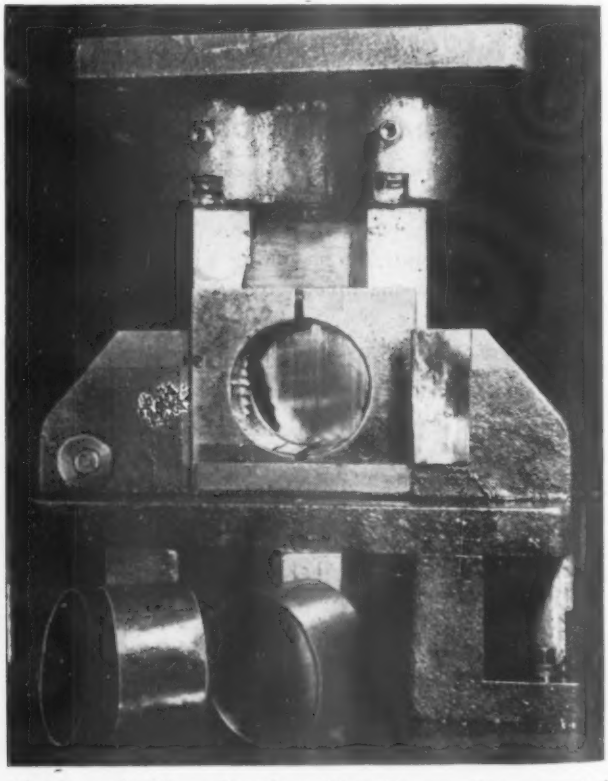
1. 11 critical screw machines.
2. More material than part weight.
3. 1575 man-hours per month.

Saved by PRODUCTION STREAMLINING

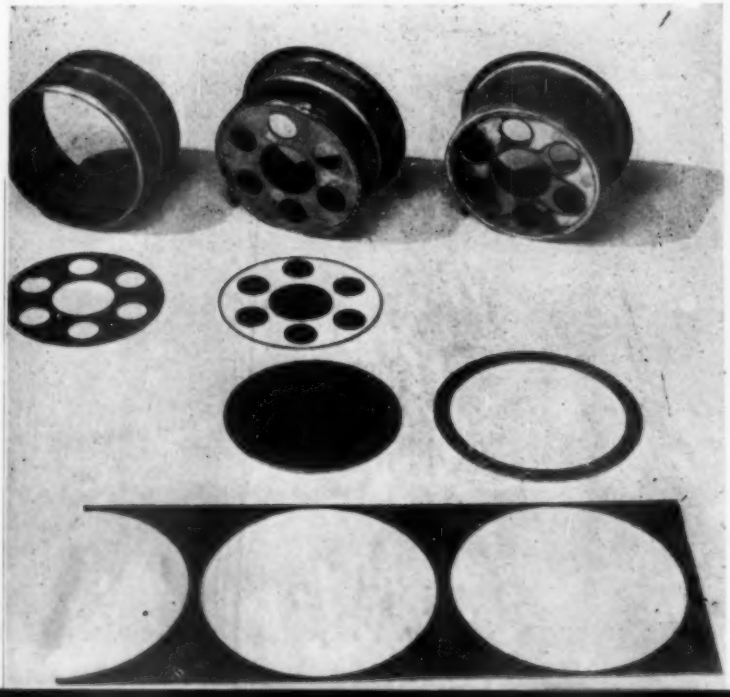
THE SPRING CASING which holds the spring furnishing feed power on the magazine is designed with an external flange at one end, an internal flange at the other. Previously, turned down from heavy-walled tubing, a considerable amount of metal was wasted. NCR decided to fabricate the casing by brazing the flanges to tubing of proper length. Tubing (5.181" O. D., .142" wall) was



First method of turning spring casing from solid wasted more material than was used.



Above, a double action broaching die was the second of three methods used in cutting tubing for spring casing.



Left, breakdown of parts in the spring casing which holds spring furnishing feed power in gun magazine.

Streamlined PRODUCTION

Girl operator does three jobs at once on plunger body. This machine saved space required for nine 2-spindle drills and four punch presses.

Special equipment of this type is neither difficult to design or construct. Savings are well worth the effort involved.

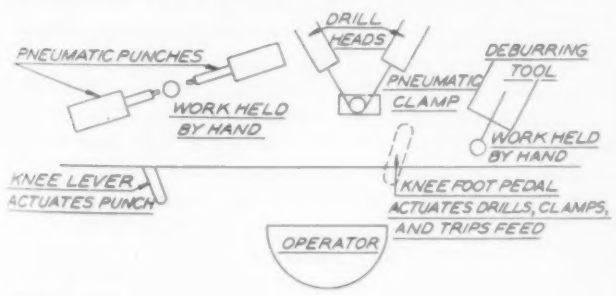
MACHINE AND SPACE SAVING

1. Four punch presses and operators.
2. Nine 2-spindle drill presses.
3. Two burring heads.

Saved by STREAMLINED PRODUCTION.

ANOTHER pneumatic application previously used by NCR production engineers in peace time manufacturing, resulted in machine and space saving. The plunger body consists of a short length of tubing with open slots at one end, diametrically opposed. Because the slots are of different width, it was not possible to mill straight across. The part is now placed over a plug, relieved to receive punches which enter from opposing sides. Air-operated, they are actuated by a knee lever, the operator holding the part with her left hand. The relatively small fixture, requiring two pneumatic cylinders with the punches connected directly to the pistons requires considerably less space than fly-wheel punch presses.

Operations on plunger body as performed by one operator.

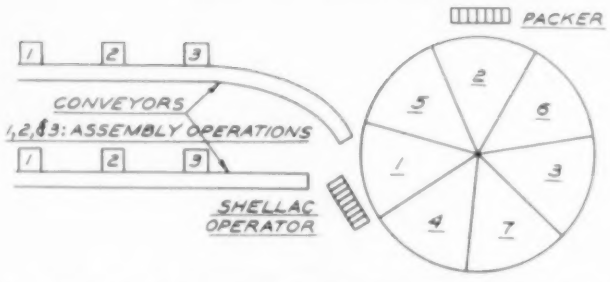


Two other operations are performed by this operator, simultaneously with the punching job. Following the slotting operation, she places the part in a pneumatic clamp which holds it while two drills, operated by a foot pedal drill, the body. While the d illing and punching operations are being performed, she holds the part against a deburring tool with her right hand. Three parts are always in process.

This group of fixtures has replaced four punch presses, nine 2-spindle drills, and two burring heads.

Plunger body consists of short length of tubing with open slots at one end, diametrically opposed. The different widths of slots prevented milling straight across the top.

Production Scheduling



A shellac application required seven minutes drying time. Production jam was averted by storing on revolving table.

SMALL UNITS or items of production scheduling determine the overall efficiency of a plant operation. NCR's method of solving a small problem affords an interesting sidelight on their manner of operation. A part which required three assembly operations and a shellac application for completion was jamming up the production line because the shellac required seven minutes to dry. Trays of drying parts were set out in numbers sufficient to create a congested area. Solution lay in performing the three operations in duplicate, one set of operations being done on each side of a conveyor belt. The belt fed the parts to a girl applying the shellac and she placed them in a pie-shaped compartment on a revolving circular table. With seven compartments on the table, an orderly, space-saving sequence was developed. By filling every other compartment, each unit revolves twice before the packer removes parts.

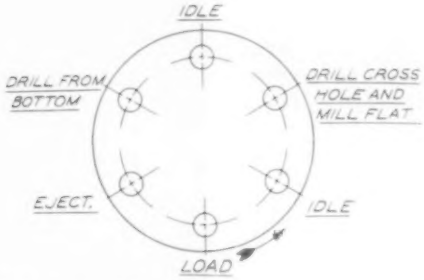
FOUR-STATION FIXTURE

1. 17 single-spindle drill presses.
2. Three milling machines.
3. Semi-skilled machine operators.

Saved by STREAMLINED PRODUCTION.

A TYPICAL PRODUCT of the screw machine, the stainless steel relay igniting charge housing is inserted between the chamber with tracer powder and the high explosive. A screw machine operation produces a part com-

Shell tracer igniter is a typical screw machine product.



Schematic drawing of six-station fixture which finish machines the tracer igniter.

plete except for milling a flat on one side of the head, drilling a cross-hole through the head and finish-drilling and deburring from the bottom up to the cross-holes.

These finishing operations required 17 single spindle drill presses and three milling machines. NCR designed a special machine of which two were built to perform all these operations. Easily operated by women, the operator loads the part at one station on an indexing table. Sequence of operation at the following five stations are: Idle; drill cross hole and mill flat; idle; drill from bottom; and eject.

PRODUCT CHANGE

TYPICAL of changes in product design which have helped in developing a production advantage is the switch from specifying a relieved surface at the end of the tapped section of a bore to relieving or providing a flange above the threads on the plug or stud. Obviously, it is easier to machine a flange or relief on the O. D. than to perform the required machining operation on the I. D.

THE END

NEXT MONTH'S PRODUCTION FEATURE

•

Streamlined Operations at a Leading War Plant

Producing an airplane engine, a large caliber gun, military vehicles and a tank, among other things, the plant which will be featured in next month's streamlined production feature offers a cross-section of applications that include practically all major machining operations.

Complete with results on savings in man-hours, materials, and critical machinery, this article will prove helpful to the readers of THE TOOL ENGINEER in the broad applicability of the operations detailed.

As you follow this new feature on machine and tool engineering, you will find that the editors are emphasizing a broad range of common production operations. This is their definite objective, rather than to draw attention to a product which you may or may not be manufacturing.

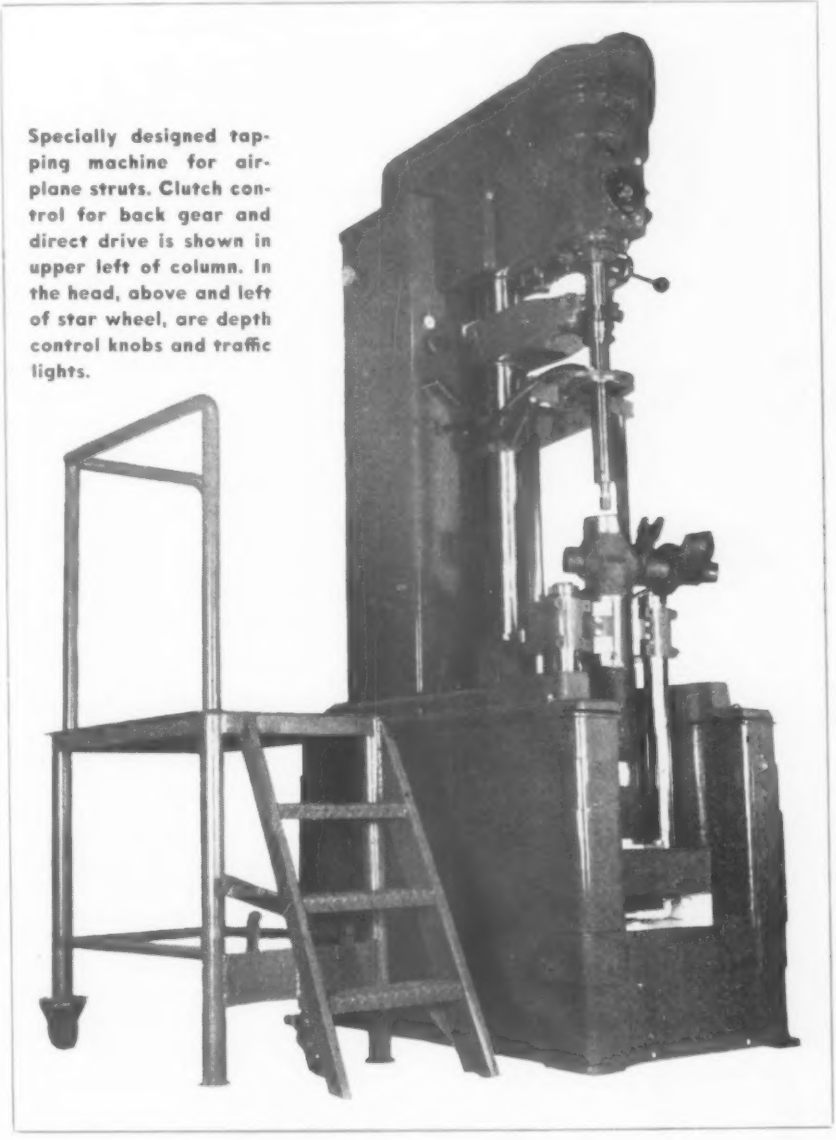
If you are faced with problems in machining, or in design of special fixtures which will save vital man-hours, materials and machines, there should be applications in this series which you will be able to use directly.

When you are able to make use of these ideas which THE TOOL ENGINEER'S sources are sharing with you, we hope you will let the editors know—a brief note will do.

TAPPING AIRPLANE STRUTS

Class 3 gage fit thread tapped in four-foot wing struts was among the last operations performed. Rejection meant scrapping hundreds of dollars in time and materials. A precision machine does the job fast and right.

RUPERT S. ARNOLD



Specially designed tapping machine for airplane struts. Clutch control for back gear and direct drive is shown in upper left of column. In the head, above and left of star wheel, are depth control knobs and traffic lights.

LICKING production problems is but one feat at which the tool engineer of today has become expert. Untold numbers of unforeseen obstacles are continually popping up in the routine of every day production of most any item in today's defense manufacturing. And it's the Yankee ingenuity of overcoming these obstacles that is rapidly putting our team out in front in the far flung battle gridirons.

One of the big engineering problems that a well-known Pacific Coast strut manufacturer had to overcome was the matter of cutting down his rejected airplane struts, 99 out of 100 of which were turned down because of faulty tapping. The tapping of these struts was one of the last operations to be performed in their manufacture, and any reject meant a serious investment loss that ran up into the hundreds of dollars. It also meant a loss of irredeemable time, for when an Army inspector put his reject mark on a strut it meant a delay of days and frequently weeks before some of General MacArthur's pilots could drop their calling cards on a Jap air base.

The tapping of these big four-foot struts was not a job for an apprentice in the first place. There were three different sizes of holes on the inside diameters of the steel casings, and a Class 3 gage fit thread had to be tapped in all three.

The second big problem that this manufacturer had to overcome was a matter of not only getting greater precision tapping, but of getting it even faster than before, for time was indeed an important item.

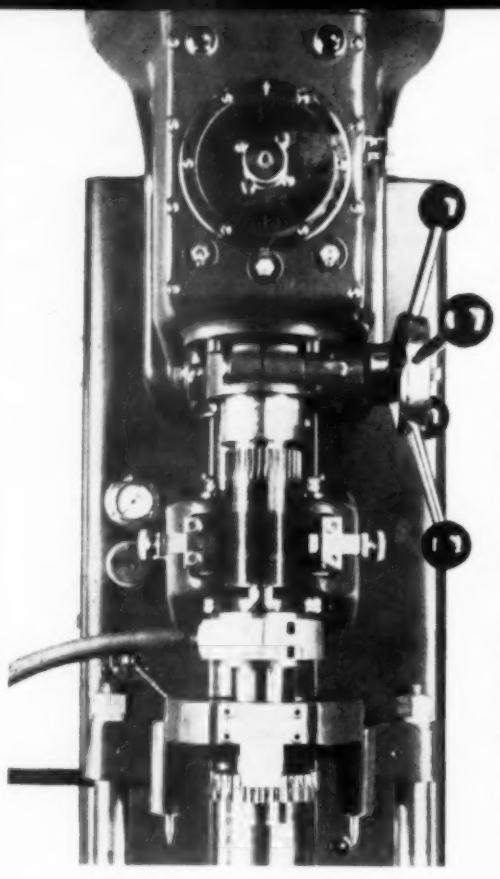
So some way or other than that offered by the horizontal boring machine was necessary for solving these two problems of accuracy and speed.

In the first place, a tapping machine had to be found that would tap Class 3 fits in 4140 SAE steel in one pass. In the second place, a machine had to be had that was big enough to tap up to 4 ½-inch holes in struts at depths ranging to 41 inches.

Precision tapping machines were well known to the tool engineers at this factory. They were already using some of the smaller Bakewell models. But so far as meeting the other requirements was concerned, that called for a specially designed model. And so the Bakewell tool engineers were called into the picture, and they had a problem to meet. Their answer was a 128-inch high machine and specially designed taps and fixtures to go with it — all planned and manufactured for the one purpose of tapping airplane wing struts.

Precision features consist of a combination lead screw and brass guide finger tap feed, hydraulic adjustable torque-resisting clutch, depth regulator and electrical controls.

The lead screw is hardened and then precision ground to the desired pitch. The upper portion of the screw is hobbed with flutes that match the threads of the lower section of the screw. Solenoid actuated brass guide



Front view of tapping machine, showing hobbed lead screw, solenoid housing and spring tensioned brass guide fingers. Fingers can be adjusted for length as they wear. Note cutting oil hose leading into collar of the tap.

fingers are hobbed with the same thread as the hobbing section of the lead screw. During the course of tapping, these brass fingers are engaged against the threads of the screw by a spring pressure toggle linkage built into the solenoid housing. As the lead screw passes up and down between the brass fingers, the wear and backlash between the guide "nut" and lead screw are compensated for by the spring pressure. In this way the hole is threaded by tapping and uniform pitch diameters are maintained to insure either a Class 3 or 4 gage fit.

Clutch eliminates spoilage

A sensitive yielding clutch is so arranged that the operator can adjust the torsional resistance of the clutch to that of the tap. If the tap becomes dull, or strikes an obstacle in the hole, the clutch slips and the tap is instantly stopped. The tap is saved from breakage and the work from spoilage.

Then there is the standard depth control which can be set by the operator for tapping to a .005 inch accuracy on every similar set up. This control is regulated by a simple combination of knobs and an indicator dial located in the front head of the tapping machine.

The electrical controls, coolant pump and drive motor are all enclosed in the rear cabinet of the machine. The drive motor is a specially designed, high reversal, General Electric model, single winding, with a reverse speed twice that of the forward. The drive transmission consists of one pulley mounted in the head of the spindle and another on the motor drive shaft. Drive is by V-belt which may be adjusted to the proper tension for various tapping speeds. In this particular model, there are sixteen such tapping speeds, making it versatile enough for practically any size hole within the capacity of the machine in any type of material.

A special "chassis" had to be built to take care of the height of the struts. The base was extended and a well was designed to hold the work and the fixture. The latter is hydraulically operated. It clamps the work into the tapping position and holds it there, bringing the strut up to the tapping height. The motor is started, the solenoid energized engaging the guide fingers and feeding the tap into the predetermined depth and reversing it. The fixture then automatically lowers and releases the strut after the completion of the tapping cycle. The automatic clamping of the fixture to the strut throws on the starting switch and the traverse of the tap is only enough to thread the hole.

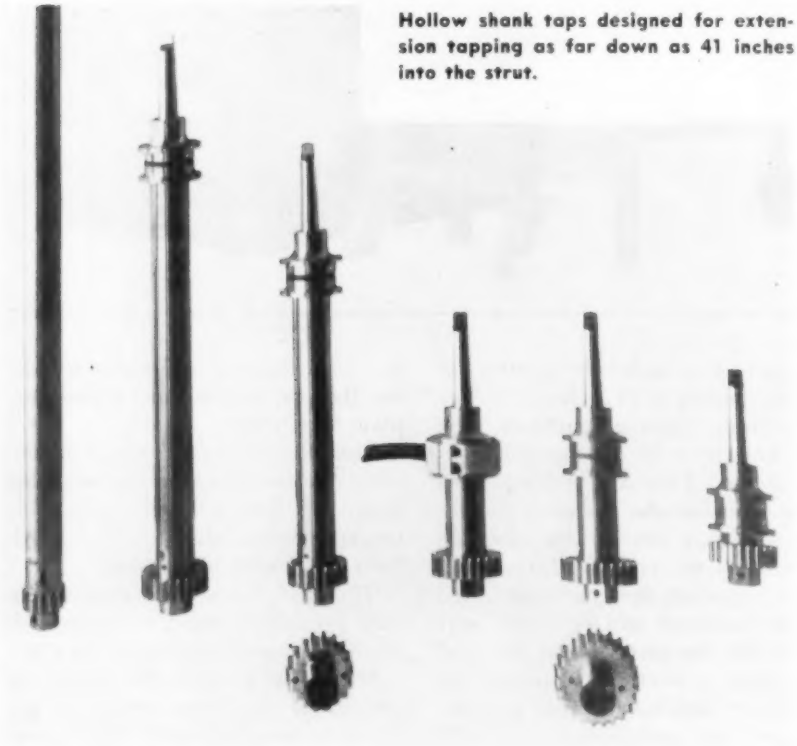
Provision for coolant

Taps of six different diameters had to be specially designed and manufactured for the strut job. These taps are of 16 and 18 pitch, extension type, and range from 2½ to 4½ inches in diameter. One unusual feature of these taps is that the cutting oil is admitted through a stationary collar to the inside of the hollow tap shank. By so doing, a flood of lubricant is maintained at the cutting edges of the tap. The taps are designed with a multiplicity of flutes which assure perfect threads with a minimum of grinding. In fact, 82 holes are threaded with but one tap grind.

•

The first tapping machine for strut tapping went into operation about a year ago. Since that time a battery of similarly designed tapping machines have been installed. Several thousands of struts have been tapped without a single reject. Tapping time has been cut from eight minutes to three with one operator working on three machines. Not only was the problem of precision licked, but that of production as well.

THE END.



Hollow shank taps designed for extension tapping as far down as 41 inches into the strut.

PLANT LAYOUT

A. E. RYLANDER
TECHNICAL EDITOR

The second of a series of articles on a vital phase of mass production

•

THE manufacture of insulated wire and cable affords an excellent setting against which to consider problems of plant layout. It comprises a huge industry, yet, one that has been but superficially treated in the general technical press. Certainly it has not been presented in connection with complete plant layout. It covers an extremely wide range of operations and processes, broader by far than entailed in most fields of manufacture. As, for example, wire drawing and stranding, rubber processing, rubber and lead covering as well as various textile and other processes.

These processes have direct relation to manufacture in other fields. As, for example, the making of rope and steel cable and, at the other extreme, such humble but necessary articles as shoestrings and tape. It is an easy transition from rubber covering (insulating) to the manufacture of rubber tubing and hose. For that matter, it is only a matter of combining various of the operations to be discussed to divert into the manufacture of rubber tires — assuming, of course, that conditions favored such manufacture at this time. And, needless to state, any of these items demand tool engineering of a very high order. The subject, then, is selected for its broad ramifications and, consequently, its equally broad educational value.

Production line impractical

As ordinarily visualized, and especially in the lay mind, the "production line" is not practical in the manufacture of insulated wire. Except, that is, where a comparatively small concern may manufacture some specialty, as automotive looms. Even then the production line would be elementary. Ordinarily, however, there are too many variations of size and specification, although No. 14 solid (for house wiring) might predominate. Even the latter varies in coloring, some being black and some white and some even marked by other color or with a tracer, as for three or multiple wire systems. Other wire may be similarly differentiated, either with solid colors or with tracers.

Some wire is solid, some stranded, some tinned, some not; others may be twisted in pairs or multiple, some may be armored and some merely varnished. And, orders range from a few feet of special to millions of feet of standard, yet, even the latter may have its variations as implied above. To produce these variations on a conventional production line system would be highly complicated, yet, this does not preclude efficiency nor smooth flow of product, as will be shown.

To acquaint the uninitiated with the processes involved, let us follow four types of wire through their various operations. We'll start with No. 14, first drawing the wire to size. The copper comes in rods, which are then reduced in a heavy wire drawing machine, running through successive dies. The wire is then annealed, when it is further reduced in smaller machines, again annealed, then tinned.

The tinning is done by first running the wire through an acid bath, then through a tin pot, both "pots" being merely shallow trays in which the wire is held down by depressor fingers. The wire runs at a pre-determined speed, and excess tin is removed by means of rubber or composition wipers. As in most operations, the rate of speed is governed by a power driven pull-out sheave, around which the wire is wrapped several times. It is then wound up on a reel, the shaft of which has a slip drive. The reel on the discarge end is known as the take-off, that on the receiving end as the take-up. In tinning and similar operations, a number of wires are run through at one time.

After tinning, the wire goes to the tubers, where it is rubber covered, or insulated. This is really an extrusion process, similar to the making of tubing, except that the wire forms a core. The machine is largely reminiscent of an ordinary household meat grinder, but on a large scale. The wire is fed through a die, the size of the bare wire, then passes through a second die which determines the O. D. of the rubber covering. As in the preceding operation, its rate is governed by a pullout; before being reeled up, however, it is talc covered to prevent sticking together.

Variations in procedure

Next, it is vulcanized, after which it goes to the braiders, to be covered with white or black yarn, or to be marked with tracer, as specified. It is then saturated with wax, and polished, the procedure of which is similar to the tinning, then bundled ready for shipping. Usually, only random specimens are inspected, since this wire runs so consistently that piece inspection is not necessary.

So much for No. 14 solid. Let us now take telephone wire, such as the familiar double or triple twisted cord. The wire is drawn as described above, but finer, and is not tinned. Also, being flexible, it must be stranded. This is done on small, high speed stranders, horizontal or vertical bench type. It then goes successively to tubers and braiders, next to a twister, then, may be either coiled or reeled, depending on the lengths specified.

Now, we'll take stranded cable, high voltage type. Here, the initial procedures are as in the preceding

Complexities of plant layout are illustrated here against the background afforded by the broad range of operations required to manufacture insulated wire and cable. In considering the many jobs to be done, the author breaks down the elements essential to efficient production sequence.

two — i. e., wire drawing, tinning, stranding, tubing and vulcanizing. The stranding, however, is done in heavy machines, of the Torrington type, and, in larger cables, is built up in successive layers having right and left hand laminations or lays. See Fig. 3, reproduced from "Mass Production Starts with Design," page 67, THE TOOL ENGINEER for April. Immediately after vulcanizing, however, the cable is voltage tested, any weak spots in the insulation "blowing out". Such spots are patched and revulcanized, then retested before passing on to the next operation. The testing is done in large water filled tanks, with the loaded rods submerged.

Providing for diversion

As an intermediate operation between vulcanizing and braiding (in addition to testing) the cable is taped. This is described in Figure 3. Should the cable now be twisted, it goes to the cabler shown. Otherwise it will be saturated and polished and reeled up for shipping. Assuming, however, that we may want to divert to lead covered or parkway cable (in the latter case each individual cable may be insulated) we saturate and lead cover in the first case, wrap with steel tape in the second. Lead covering proceeds largely on the principle of tubing, except that the lead is extruded under hydraulic pressure in presses of the Robertson type. The lead is not fluid, merely plastic, solidifying as it leaves the die.

In the case of parkway cable, the cable is successively taped, saturated, jute covered, again saturated, then steel taped. This is similar to the fabric taping shown in Figure 3, except that the machine is horizontal and assumes considerable length. After taping, it is again saturated, jute covered and then lead covered, when it is ready for shipping. The jute protects the cable proper from being cut by the steel tape, or the latter from injuring the lead casing. Rounding it out, the saturation prevents rust and corrosion, as does the lead covering, while the armor in turn protects the cable from rodents, borers and even from being cut with a spade.

We now have three different types of wire, the third of which has been subject to considerable variation in its latter stages. We'll now take automotive cable, for primary and secondary wiring. Except for being flexible and therefore stranded, it is handled as described above, the only deviation being that high tension (spark plug) wire is volt tested. After braiding, however, it is varnished, a term that will include lacquering. The braided wire runs through what may be termed dies, although they are really bushings, the leader of which merely tends to confine the liquid while the follower acts as a wiper. After impregnation, the wire may be air dried on large wheels of the Ferris type, or run vertically through heated ducts. The latter is the faster way; in either event the varnish must be dry when reeled up. Some automotive cable is armored, this, however, merely implies continuous winding with half round wire.

These various operations have been described so that the reader will have an idea of method and the flow of materials. We will now, briefly, describe rubber processing, omitting, (for

Whether you build cable, tires (or refrigerators when war is over), your plant layout problems will be common to those discussed here.

Flow of materials and balance of production of any item depend upon skillful organization of supply lines.

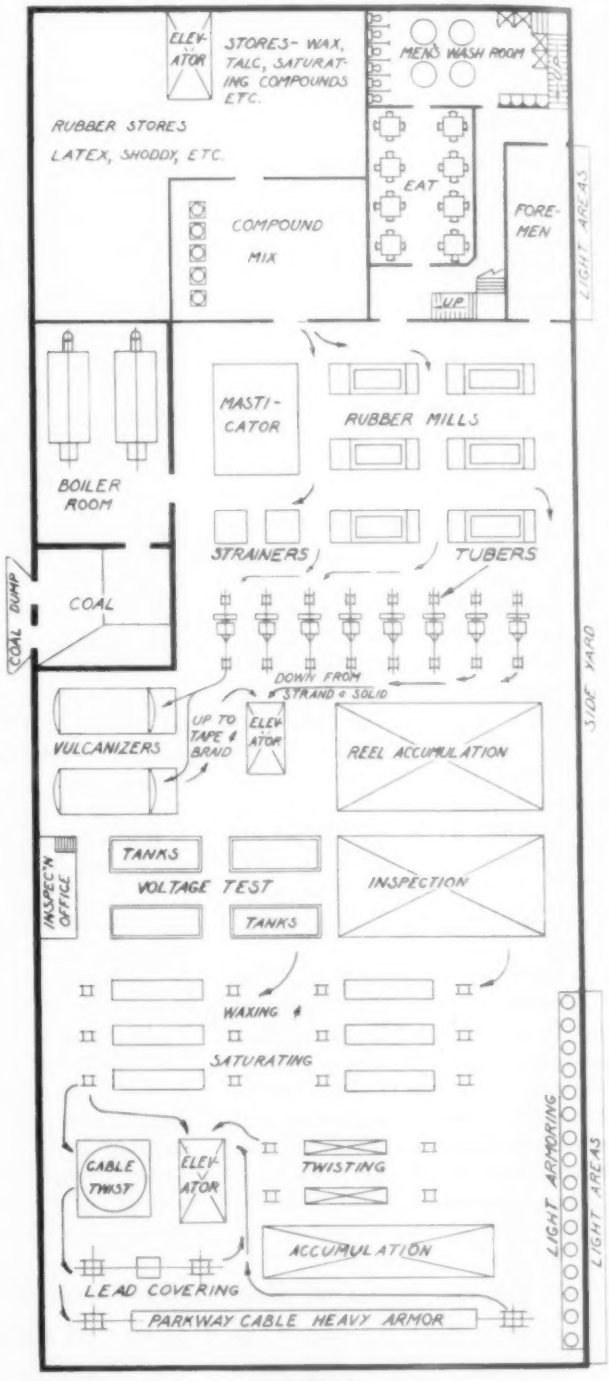


FIGURE 1.
SUB-FLOOR, OR BASEMENT, PLAN

reason of policy) the ingredients used in compounding. Sufficient to say that a certain amount of scrap or should — is mixed with pure latex. After compounding, it goes to a mixer, is then thoroughly worked in a mill. The latter consists of two large rolls, steam heated, and running the same rpm, but one roll is slightly larger than the other. This results in a sort of grinding or kneading process, somewhat similar to the mixing of dough in mass production bakeries.

In milling, the rubber winds itself around the upper roll in a continuous sheet, which is cut and rolled up as soon as the rubber is thoroughly kneaded. It then goes to a masticator, where it is further worked, then to a strainer, where impurities — especially metallic — are removed. Ob-

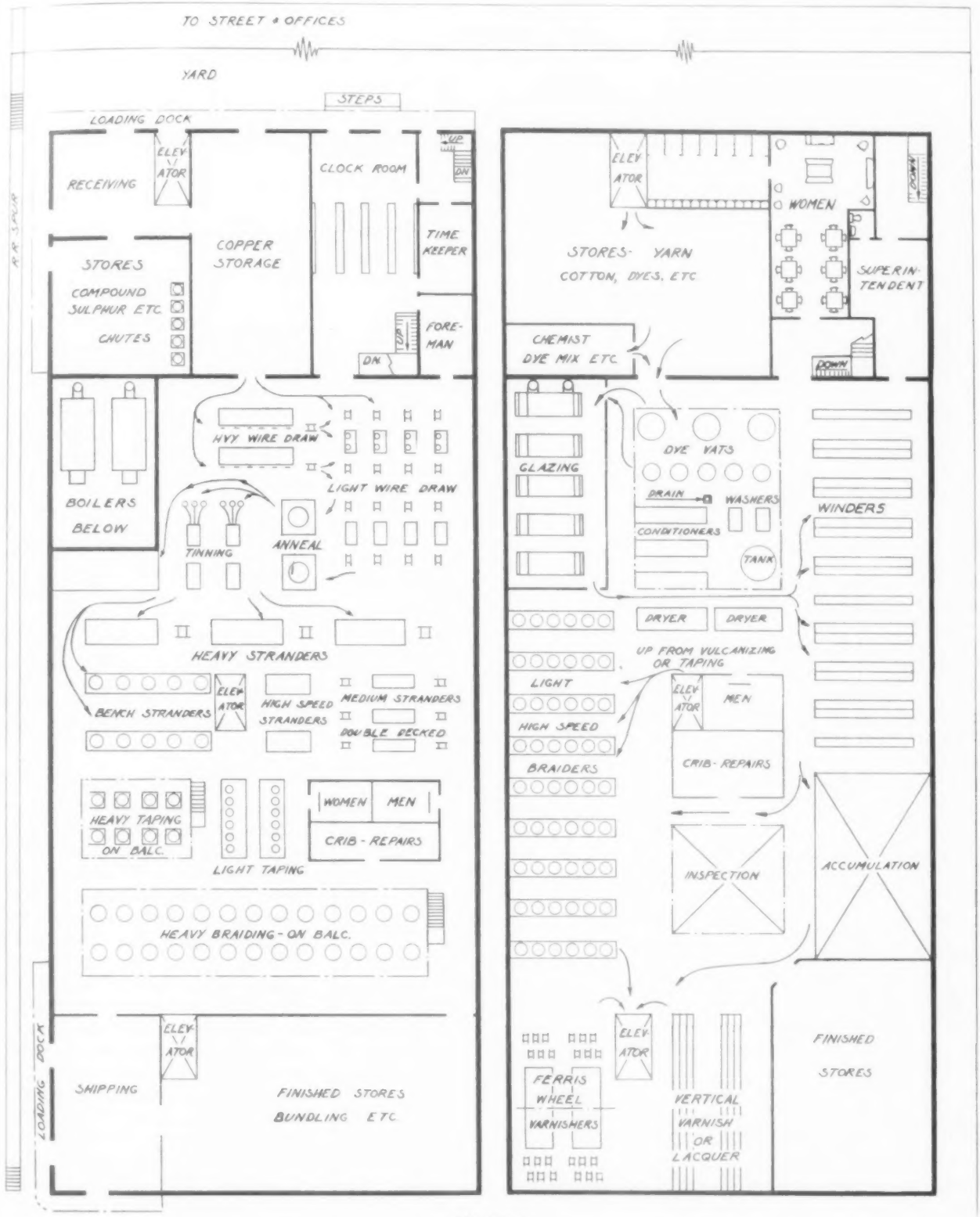
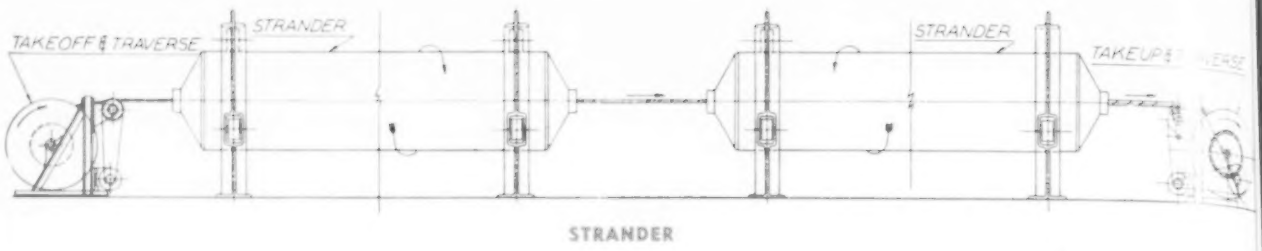


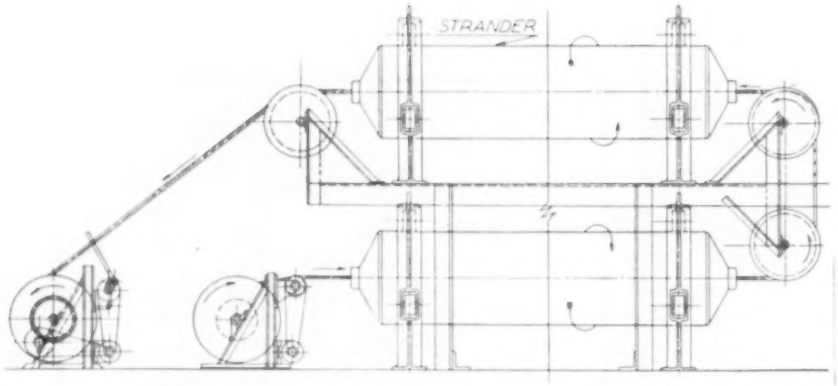
FIGURE 2.

MAIN FLOOR PLAN

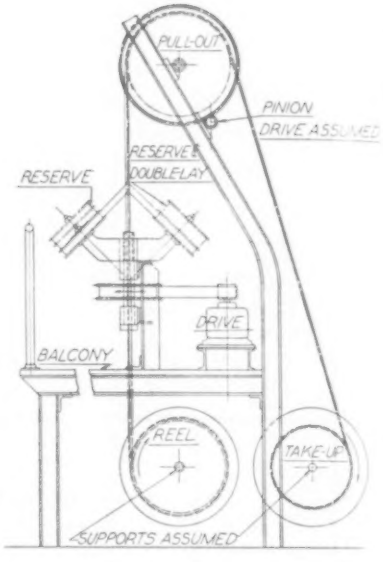
UPPER FLOOR PLAN



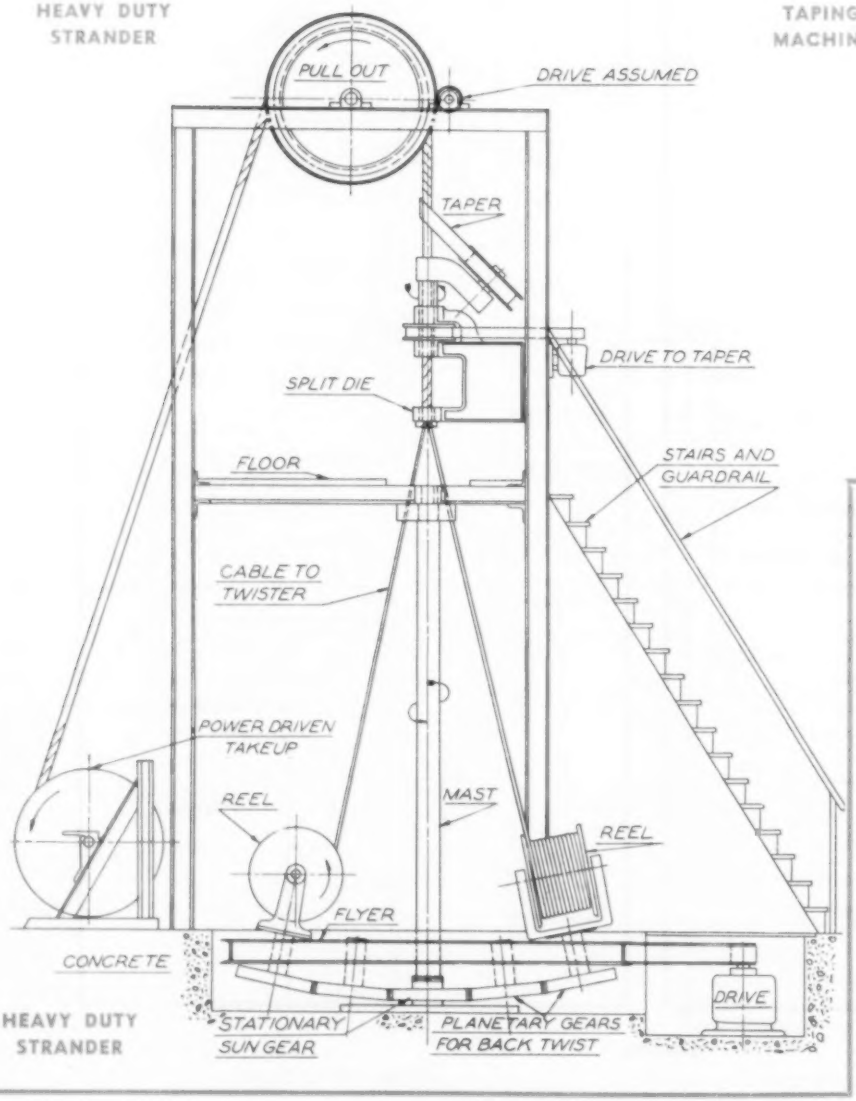
STRANDER



HEAVY DUTY STRANDER



TAPING MACHINE



HEAVY DUTY STRANDER

FIGURE 3.

The two-deck strander relieved an operator from walking from unit to unit, making use of headroom, saving floor space. Productive time was increased, operator fatigue decreased.

Taping machine above shows in broken lines the improvements for installing tape rolls. Heavy duty strander was an improvement over horizontal machine.

viously, any particles of metal would be liable to create shorts, or grounds, could even prove fatal to an unsuspecting handler. After straining, the rubber goes to the tubers.

In the manufacture of yarn, for braided covering, we have textile processing. Were we to start at scratch — *i.e.*, with the baled cotton —we would go through various spinning and spooling operations, however, we will take the yarn as received from the mill. Some of this may be immediately wound on spools, and used white; the most, however, may have to have further processing. The first would be dyeing to whatever color specified. This is done in vats, tightly covered during dyeing, and steam heated. The dye is usually run off after each batch.

The yarn must also be washed, conditioned and dried, after which it goes to the glazers. Then, it goes to the winders — usually Universal — which are set up in batteries on opposite sides of sub-aisles, one operator to a battery. Here, the yarn is wound up on spools suitable to the braiders used after which it is either stored until called for or diverted directly to the braiders. The latter may be of the horn gear type, although these are practically obsolete for modern production demands, or to high speed braiders of the Wardwell or circular loom type.

Elements for plant layout

We now have a fairly comprehensive grasp of the various processes involved, can intelligently discuss plant layout. In this case, we have taken a plant of three floors, shown in Figures 1 and 2. The main floor includes receiving and shipping, at opposite ends of the building. Both are served by the same spur track, and both have loading docks to serve both rail cars and trucks. The first includes space for raw materials, the latter for finished. The main floor serves for all wire processing, as drawing, stranding, tinning, etc., and for light and heavy taping and for heavy braiding.

The sub floor serves as the rubber room — the mills, masticators, strainers, tubers, vulcanizers, etc., and for voltage test, saturating, twist, lead covering and parkway cable, and for armoring — for most of the heavy processes. It also contains the boilers, although these could be remote. The upper floor is the textile room — dyeing, conditioning, glazing, winding, light braiding, and varnishing.

By means of elevators, judiciously disposed, stock can flow from one process to another, or be diverted as expedience warrants. For example, all wire and cable goes to the tubers immediately after drawing or stranding, except that some is tinned. Hence, the center elevator is properly disposed to move product from one operation to another. Note that, on subfloor, the vulcanizers and test tanks are also disposed in easy proximity to this elevator. One can move vulcanized No. 14, for example, directly to the third floor by the same elevator, for braiding, or, one can move heavier wire back to the main floor, for taping and heavy braid.

From there, it flows to saturating, lead covering, armoring, etc., and thence directly to shipping or finished stores. The rear elevator also moves finished stock from third floor to shipping. The whole results in a fairly smooth, natural flow, modified only by the limitation of plant area which necessitates several floors instead of one. For that matter, a bit of study will show that a plant laid out entirely on one floor would entail certain disadvantages rather than improvement.

Note, here, that the front elevator (at receiving) is so disposed that one can move material direct from the loading dock, or from raw stores to upper or sub-floor. Each floor has its own stores; such as rubber, copper, yarn and wax. Compounds are dumped directly into hoppers, whence they are taken in the mixing room below. Note, also, the proximity of the boilers to the vulcanizers, and that the dye vats, on the upper floor, are also close to the boilers. This means short transmission of steam, an advantage in vulcanizing the while most heavy lines are confined to a comparatively small area.

Drainage is important

Here, a few general cautions. It should be readily apparent that the dyeing and processing of yarn involves a considerable amount of water. Hence, drains should be adequate to accommodate all vats should they be dumped simultaneously. While this would be an unlikely occurrence, drains so figured would take care of washers and other equipment. In this connection, the writer recalls that, some years ago, he warned against inadequate drain areas in a dye plant. The warning was ignored, and the unusual eventually happening, the "dump" backed suddenly up along the soil pipes. The result was spoilage of about a thousand dollars worth of finished stock as the dye geysered ceilingward from floor drains. Provide adequate disposal in your plant.

Modern plants should have adequate comfort and rest room facilities, especially for women. We've got to get away from the archaic idea that the bare necessities will suffice, although this need not imply extremes. But, however greasy an employe may be at his work, he is quite another personage when "dressed for meeting". Adequate washroom facilties, with showers, will encourage neatness, while lockers, in which personal belongings may be safely kept, would encourage change of clothing. If no good restaurant is adjacent — and they're closing down fast under OPA restrictions — or if no plant cafeteria is considered, then facilities should be provided for employees bringing their lunches.

Using sub-levels

Again referring to the illustrations, note that the boiler room is a well, extending to but not through the third floor. This can be obviated, if one desires, by making the boiler room sub-level in relation to the floor (usually the ground) on which it is situated. That, however, is a matter of expedience and subject to the discretion of the plant engineer. Test tanks, or similar equipment, should also be sunken, but provided with guard rails and, of course, drains. Incidentally, supply pipes should be large, to facilitate filling.

In the plant layout described above, practically all but the most minor operations have been considered in relation to their order of flow. The product as a whole may be considered as the body of the main stream, with junctures of feeders to tributaries and the latter to the main occurring at logical points. In this case, however, there are diversions as product varies, yet, each deviation in turn proceeds to its end — the shipping room. In this connection, however, the reader may note that aisles have not been shaded in the illustrations; this is an intentional omission and should not detract from the plan.

Adequate service facilities

One note in conclusion—provide adequate crib and repair or service facilities. For example, braiders require specialized service and should have their own repair station. Naturally, tool room and general maintenance facilities must be provided. Here, they are assumed, the layout being confined largely to manufacturing. Again, we suggest that the layout described may not suit your particular requirements, but it will convey ideas that you can apply to your own problems in plant layout. Besides you now know something about the manufacture of insulated wire.

THE END.

Screw Machine Progress

Part 1: With full consideration of tools and attachments, this first in a series of articles on automatic screw machines presents a description of the various types of light and heavy single spindle equipment. It tells how they work, what they can be made to do.

JOHN E. HYLER

AUTOMATIC SCREW MACHINES have advanced far in design. They have evolved into a sufficient number of types to be somewhat confusing to the average mechanic in the overall view. New machines continue to be developed. In an effort to consider the various types of machines, together with the equipment and the tooling available for them, it seems expedient to preface this series of articles with a statement as to basic functions. This is done for the benefit of the occasional reader who has as yet had little or no insight into the subject. Functions which are basic and common to all automatic screw machines include the following:

1. The feeding of the ends of stock bars into working position, automatically; holding them there, and revolving them on their axis through a time or working interval.

2. The automatic positioning of successive tools in proper working locations; their automatic advance to the cut, and automatic withdrawal after the cut.

3. The changing of feeds, and the changing of speeds, automatically, to insure economical operation as to time, and to provide the required degree of quality of workmanship.

Materials. Standard screw machine rods may be obtained in diameters from 1/16" upward in increments of 1/16", to 1¼" or more. Various sizes above this may be obtained as needed for specific purposes, there being some screw machines with capacities for handling stock 8 inches in diameter. Most of the stock used is round, for simple turned items, but a considerable amount of hex stock is used also; some square material is used, and special shapes of different kinds are used to some extent. As the screw machine has increased in the scope of its duty, different materials have become quite readily available in the form of screw machine rods.

Convenient stocks of screw machine rods in aluminum have become available. Brass is highly favored for many types of screw machine products, and free-cutting brass rods have been provided by some of the leading brass companies. Not only leaded, free-cutting brass, but Everdur, phosphor bronze, hardware bronze, commercial bronze, nickel silver and copper are all made available in the form of screw machine rods by at least one large brass manufacturer. Steels in rod form that offer much in ready machinability are available from various steel companies. Cold drawn bars often have such a degree of accuracy and of surface smoothness that the existing surfaces may be used for the greatest finished diameter, without any machining. This means maximum economy both in steel and in machining time. Some firms supply rods that are low in carbon, but high in manganese and sulphur; these are particularly suitable for automatic and other highspeed cutting. Even in the matter of stainless steels, great progress has been made in producing a readily machinable rod.

Single Spindle Machines

IN ONE outstanding line of single spindle automatic screw machines, the hollow spindle through which the stock is advanced, has two separate pulleys mounted upon it. Between these two pulleys a clutch unit is mounted. The arrangement is such that either of the pulleys runs freely when it is disengaged from the clutch, and the clutch may be moved into engagement with either of the two. Both pulleys may be driven from the same overhead countershaft with different sizes of driving pulleys, thus giving two different speeds on the machine spindle, by shifting the clutch from one pulley to the other. Again, by driving one of the pulleys with a straight or open belt, and the other with a crossed belt, reversing motion may be had on the spindle by shifting the clutch from one pulley to the other.

With these adaptations, many different speed variations and combinations are available, either with or without a reversed spindle action. Several different models provide 36 different spindle speeds, but there is one machine in the line which is very highly developed in this respect, having positive drive through roller chains to the spindle at all speeds. Through the interposition of change gears, 120 different combinations of spindle speeds in 10 different ratios are provided, the spindle speeds available ranging all the way from 3,000 to 67 rpm. Using roller chain drive to the spindle in the case of this machine, of course, means that the two pulleys ordinarily used on the spindle are replaced with two sprockets, and the sprockets are made engagable to a clutch unit operating between them.

The more fully developed, standard machines in this line are provided with two cross-slides for carrying tools to the work for turning, forming and

cutting-off operations, and they also have a tool-carrying turret, the latter having six different tool positions. This turret, unlike that of a turret lathe, revolves in a vertical plane when indexed. The indexing motion of the turret is automatic, to bring the successive tools into working position. The advance and the retreat of both the turret and the cross-slides are governed by special cams designed to suit each particular job being machined, the cams being of peripheral type.

Those who may not be acquainted with the type of machine under consideration, though it is a familiar and long-established design, will find an examination of Figure 1 helpful. This gives a very clear view of the machine from the operators station, which has a roller chain drive to the spindle as mentioned. The drive is by roller chains from a constant-speed motor located on a bracket on the base, to the speed and ratio change gears formerly mentioned, and thence by roller chains again to the two sprockets on the spindle, between which is interposed the clutch unit. The 120 different combinations of spindle speeds in 10 different ratios are provided when this machine is fitted with a spindle having a capacity of one inch. However, the same machine may be had with a spindle of 1½" capacity, in which case the number of two-speed combinations for the spindle is reduced to 100.

While space forbids going into much detail on the design of machines of this kind, it may be said that in general the cross-slides are operated and controlled by cams mounted on a cross-slide-camshaft running along the front of the machine; the sliding action of the turret is governed by a cam mounted on a lead-camshaft running at right angles to the first camshaft mentioned, and the two are connected together with bevel gears. Thus, positive synchronization between the two camshafts is assured at all times, and it becomes possible to so design and place cams on these two shafts that the inter-relational functioning of the turret and the cross slides will be correct and proper, so as to make the fullest possible use of production time, and at the same time avoid any interference between the tools on the different units.

Figure 2 shows a close-up of the tooling zone on a machine of this kind, with the hinged cover thrown back from the front side, revealing clearly the spindle end, the turret tooled for a given job, the front cross slide, and the operator applying a micrometer to a test piece.

•

Operating Efficiency. The overall basic requirement for highest operating efficiency on these machines is of course to produce the greatest possible amount of work that is up to the required standard in the shortest possible length of time. There are cases where relatively simple work is to be run in very large lots, where machines that are more simple in operating design will do the work equally well, and it should be noted that simplified machines have been designed and built for such duties. There are some cases where the chief function is simply that of cutting off, in which case the use of a turret is entirely uncalled for. Machines of the cutting-off type are therefore made without the turret. Too, there are machines of simplified type that are used for screw threading in large lots, and where threading is the only end-approach operation. Such machines incorporate a cam-operated threading spindle, instead of the turret with its necessary indexing mechanism.

These simplified machines, while they are not automatic screw machines in the very fullest sense of the term, are nevertheless basically similar and very closely allied. They save considerable money on the original investment, so far as these simpler types of work are concerned.

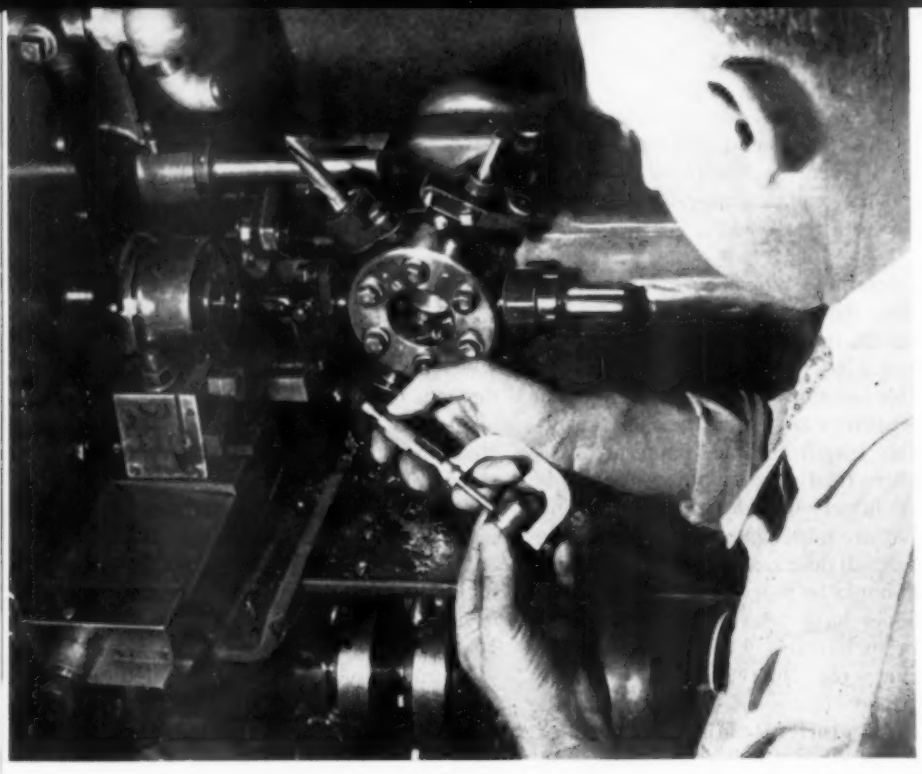
Plants having a battery of automatic screw machines quite often have units of different functioning possibilities and of different capacities. Where this is the case, the first step in operating efficiency is the selection of the machine best adapted for the particular job to be produced. Once given a specific machine on which to do a specific job, efficiency depends on a number of factors.

At this point, it should be noted that manufacturers of automatic screw machines of the types under consideration have provided a treatise in book form which has specific reference to their own machines, and it is highly important to have this book in hand in connection with the actual operation of the machine.

Efficient operation depends on the use of a suitable surface speed for the particular material being machined. As a rule, aluminum and free-cutting brass are machined at the highest speeds available, but all other materials vary. Having found the correct surface speed for a given material to be machined, this must be translated into rpm. by computing the diameter of the material against the required surface speed.

Having found the ideal rpm., the possibilities of the given machine as to rpm. speeds is explored, and the one most nearly approaching the ideal is selected for use. There is the proposition of selecting the best tools, and arranging them in the best possible cutting sequence, with regard to both the cross-slides and the turret.

FIGURE 1. Brown & Sharpe machine offers 120 different 2-speed combinations. Speeds available on this equipment when fitted with one-inch capacity spindle.
Brown & Sharpe photo



Brown & Sharpe photo

FIGURE 2. Close-up of tooling zone, Brown & Sharpe automatic screw machine. Reveals the spindle end, turret tooled for a given job, and front cross slide.

In some cases, operations can be overlapped. That is, there are some cases where by careful planning and tooling, a tool on the cross-slide may be in operation at the same time as one on the turret, and such over-lapping saves production time, when it can be consistently done.

Finally, there is the designing and the production of the cams, to impart exactly governed and timed movements to the various tools and their carriers, in addition to the adjustment of tripping dogs on drums for engaging and disengaging clutches for the control and timing of auxiliary motions having to do with such factors as the rotation of the spindle, the feeding of the stock through the spindle and the indexing of the turret. Instructions as to all of these functions, as well as recommended surface speeds for different materials, are to be found in the treatise before mentioned.

●

Tools and Attachments. It is no exaggeration to say that tools available for automatic screw machines of the nature described would fill a book. They literally *do* fill a book, for a sizable catalog is available which shows them, and the possibilities of the tools shown in the aggregate, as made by the same manufacturer that furnishes the machines, is tremendous. In addition to tools as such, there have been developed various auxiliary attachments which go far in broadening the scope and the versatility of the machines. A means of oiling directly through turret tools, of especial benefit in the case of drills and reamers, has been developed. Automatic rod magazines of both mechanical and electrical type are available which keeps the work spindle of the machine supplied, and these are of especial benefit for high speed machines, and for the simplified cutting-off or screw threading machine formerly referred to.

Of greatest production interest, no doubt, is the type of attachment which receives the workpieces as they are cut off in the screw machine proper, after it has done all the work possible on them, and transfers the pieces into a second working position for further operation. Such attachments are in reality a small machine in their own right, designed to work in synchronism with the screw machine proper.

One such attachment carries a single cutting tool for removing burrs, or for taking other light cuts on the cutoff end of the workpieces. Facilities are of course provided in the attachment for holding and rotating the parts on their axes while the cutting tool does the work. Another "transfer" type of attachment is an index drilling attachment. A transfer arm carries the severed piece of material to the attachment, where either one or several angularly-spaced radial holes are drilled, as in the making of binding posts, capstan screws and like work. Nut tapping attachments, rear end threading attachments which hold the cut-off piece so it can be threaded on the last end, and screw slotting attachments all involve the primary proposition of a transfer arm for carrying the work to a second location, where the work proceeds on it at the same time that the following piece is being fashioned by the automatic screw machine proper. Such a method saves all of the time that would be required for a second operation, for without such attachments, a second-operation process is necessary.

The above are but a few of the attachments available for these machines. There are vertical slide attachments, which provide a third slide and add greatly to the versatility of the machine. There are longitudinal turning attachments, thread chasing and low threading speed attachments, devices for cross-slide or cross drilling, and auxiliary units for revolving drills in the turret, where very high speed on a drilling operation is needed. The drill is of course revolved in a direction counter to stock rotation to provide the additional speed. There are tap and die revolving attachments, combination drilling and tapping attachments for the turret, special turret and cross slide milling attachments, not to mention hopper feeds for second-operation work.

●

Heavier Single Spindle Machines. Automatic screw machines, extending into fields of heavier work, call for a departure from a turret design in which tools extend radially from the periphery of the turret, in order to hold the tools and revolve or index them in a smaller amount of space. Too, as in the case of the lighter machines, there are some single spindle automatic screw machines in the heavier class which dispense with the use of a turret altogether, where certain forms of work are to be performed.

An outstanding builder of single-spindle machines for heavier work has one screw machine, in which the turret is eliminated, and a so-called milling slide is substituted, which has a cam-actuated motion to and from the spindle. This milling slide has tee slots cut full length through its work-

ing surface, parallel to the spindle axis, and tool blocks carrying turning tools may be mounted and clamped upon it for turning one or more diameters of different lengths. By setting two or more tools for the same diameter over the same span, and by varying the spacing of those tools, length spans can be closely governed, and as many combinations obtained as may be necessary. Also, this milling slide allows the performance of one end operation such as drilling, tapping or threading, using a collapsing tap, self-opening die-head, or other readily withdrawable tool, and aligning it perfectly with the spindle when clamping it to place on the milling slide.

In addition to the milling slide, this type of machine carries two cross-slides in the manner that cross slides are usually arranged. An outstanding feature of this machine is that a so-called cross slide turning attachment can be provided for the front cross slide. This really consists of an auxiliary slide mounted atop the front cross slide, the auxiliary slide being movable in a direction parallel to the machine spindle. Actuation is effected through a connecting rod, lever, and cams on the operating drum. Thus, turning can be done at the front cross slide during the same time that it is taking place on the other end of the work, by means of tools mounted on the milling slide. The front cross slide proper first carries the tools in to the required depth of cut, then the auxiliary slide is actuated to carry them parallel to the axis of the work for turning.

This provision has been found most effective, on this particular type of machine, with reference to relatively long workpieces. One special machine of this kind has been developed for turning shafts up to 1½″ diameter and up to 18″ long. An application of this type of tooling may be seen in Figure 3. Here the milling slide travels spindleward; the rear slide comes straight in and retreats, while the combined motion for the front cross slide is indicated by the arrows. This machine is fitted with an independent cutoff, therefore no cutoff tool is shown on the rear cross slide. Machines of this type with a diameteral capacity of 2½″, and with a shorter feed length of 10 inches, are also standard, and there are also smaller-capacity machines.

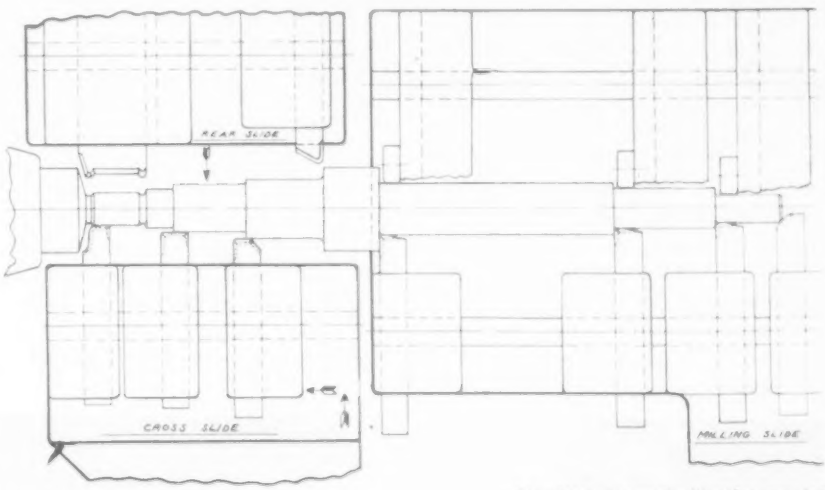
Heavy-duty single spindle machines which provide turret tooling have their turrets designed to index upon an axial line parallel to the spindle axis, and carry their tools protruding from an end face of the turret, instead of having them on the turret periphery. The turret axis is of course offset from the spindle axial line sufficiently to bring the tools into perfect alignment with the spindle and the stock, successively. However, such machine design also is carried into the making of machines of relatively small diametral capacity. Illustrations of this type of turret design, in relation to the machine spindle, can be quite clearly seen in Figure 4 and Figure 5. In Figure 4 is seen a machine of this kind at work in the plant of the Spencer Lens Company. Jobs cited as produced on this machine are eyelens mount and sleeve for binocular field glasses, turned from round aluminum bars; pinion shafts from SAE 1120 steel rod; draw tubes for microscopes cut from brass tubing, and other work which must be held to very close tolerances. Figure 5 shows a very heavy-duty machine, of somewhat different design, though similar. This machine has a 5¾″ capacity, and is available in sizes up to 8″ capacity. The one shown operates in the plant of the R. K. LeBlond Machine Tool Company, and among other operations, is used for the production of cluster and other gear blanks. The machine shown in Figure 4 is available in sizes to 1⅛″.

The heaviest models of automatic screw machines built by this firm are fitted with a single cross slide, while those for lighter work have a front and a back cross slide. In either case, the T-slots milled into the slides are cut perfectly parallel to the work spindle, thus insuring proper alignment of the tools, and positive clamping of the front and rear toolposts. A hardened steel roller is mounted in the base of the turret directly in line with the work spindle, and the bearing of the cam that actuates the turret travel is directly against this roll. This means that the thrust is directly in line with the work.

•

Providing Cams. The production of the cams for actuation of cross slides and turret on the automatic screw machine is a particular job. As produced for the line of machines first outlined in this article, cams are made from a simple piece of plate steel, which is divided radially into hundredths and carefully laid out according to the motions it is required to obtain. Machining may be done in different ways. After the outline of the required cam is scribed on the plate, one can cut it out with a bandsaw, staying just enough outside the line to smooth it down with a file. A better method of cutting the various cam lobes is to use a milling machine. It so happens that the manufacturers of these screw machines are also milling machine specialists, and that they also publish a milling machine treatise which contains a section dealing with the best methods for machining cams.

However, some have found it particularly advantageous to profile cams by the pantograph method, us-



Cleveland Automatic Machine drawing

FIGURE 3. Shaft tooling on screw machine, incorporating a milling slide. Note combined motion for front cross slide indicated by arrows *(lower left)*.

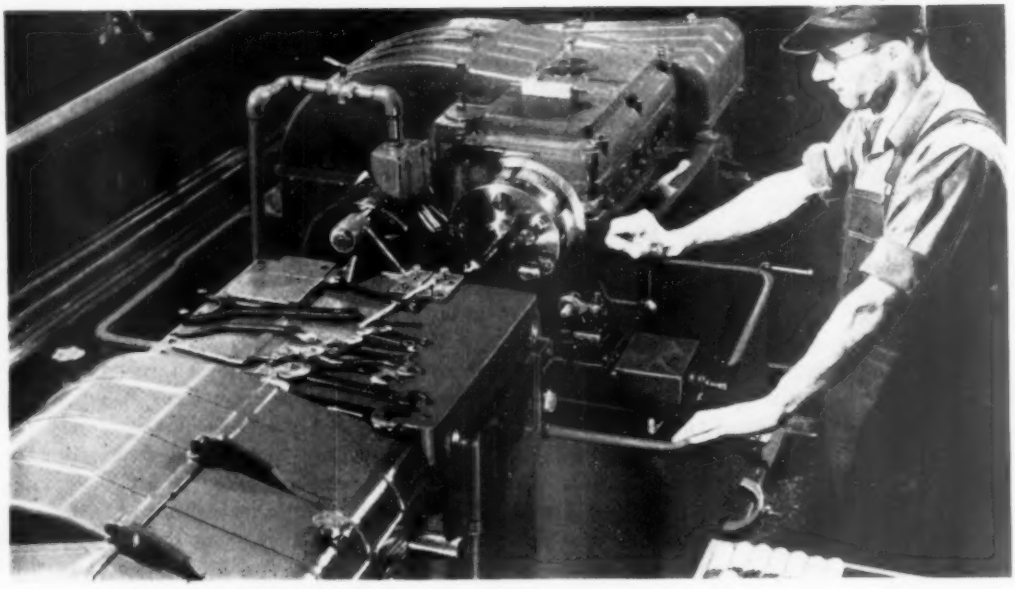


FIGURE 4. Automatic screw machine of 1⅛" capacity in plant of Spencer Lens Company.

Cleveland Automatic Machine photo

ing a high-speed profiling machine for the purpose, and beginning with a very thin sheet of stock on which the cam pattern is twice oversize. The method contemplates laying out the contour on a drawing in the drafting room twice oversize, then this drawing is mounted, using shellac, to an annealed steel sheet .030" thick, which is cut and filed to the drawing contour of the cam. This thin sheet is then used as a template to guide the pantograph mechanism which controls the path of the cutter. Since the template is twice oversize, any errors which it contains are reduced by this proportion on the finished cam.

There are many users of automatic screw machines that prefer to have their cams made by an outside firm, and it is a fact that there are several who offer a complete cam service. The firm making the machines which use peripheral cams, outlined at the beginning of this article, has such a service, and there are others specializing in the work. A peculiar aspect of cams was noted with reference to one firm some time ago, who made up what they chose to call "Unicams", the idea being to make up separate cam lobes which could be assembled on a spool, making it possible to build up a cam from several lobes, which would do the work of a solid cam. Doubtless this would be very helpful in many places and cases. Circular lead cams, too, may be obtained for the heavier types of machines using them, from firms which specialize in their making. Some of these furnish lead cams with an alloy steel face, and cutting-off and forming cams made of special alloy steel calculated to absorb any shock. THE END.

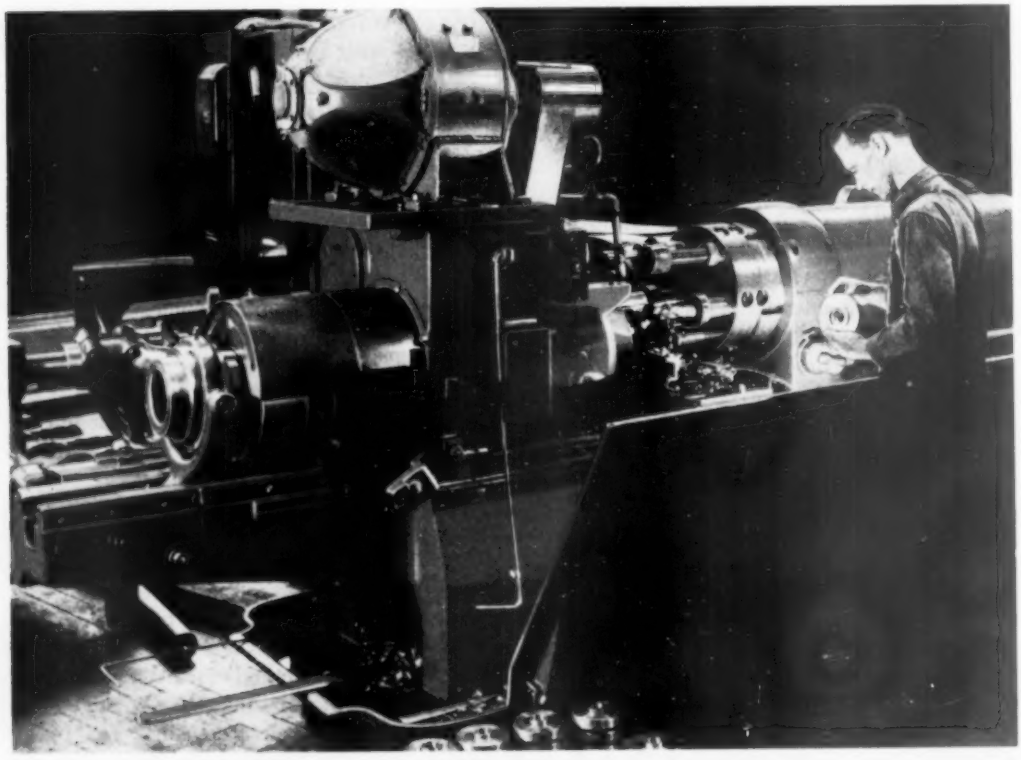
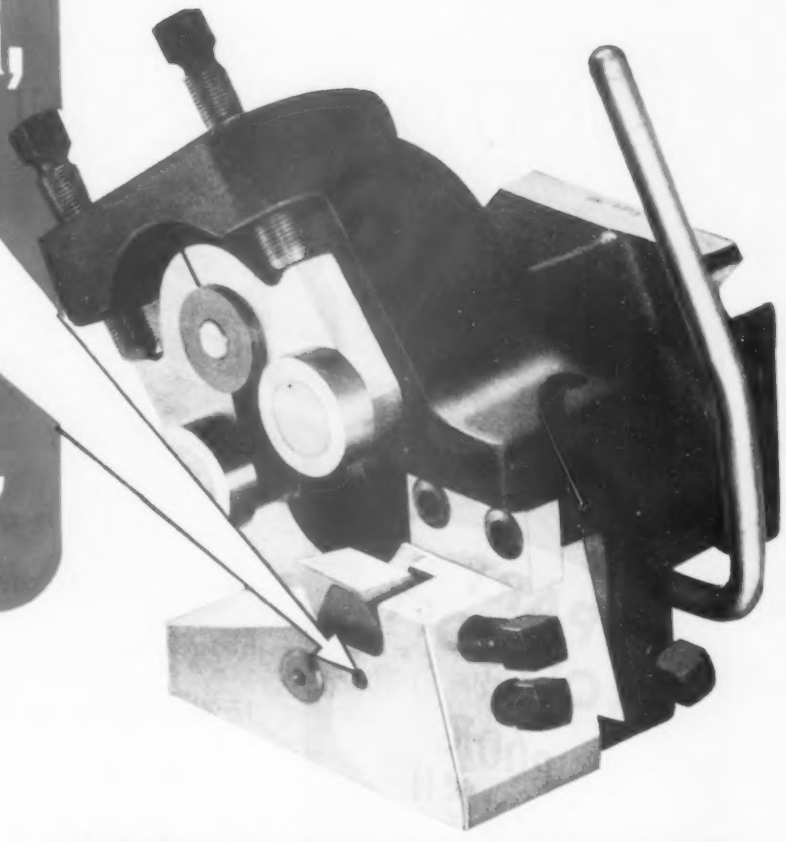


FIGURE 5. Automatic screw machine of 5¾" capacity in plant of R. K. LeBlond Machine Tool Company.

Cleveland Automatic Machine photo

"BROTHER, THAT HOLE ISN'T THERE JUST FOR DECORATION!"

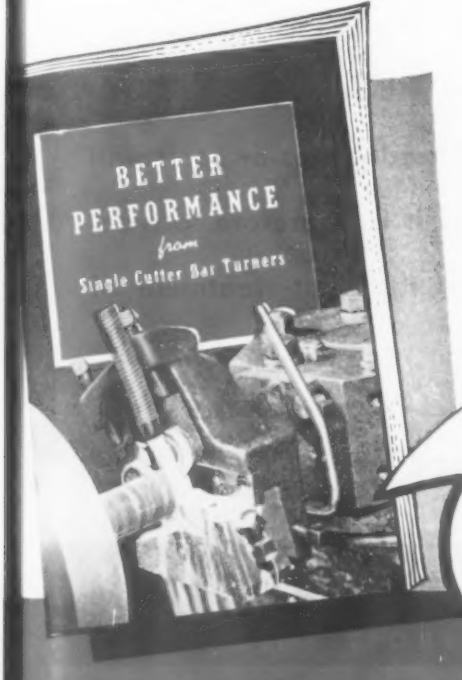


FIELD STUDIES in scores of plants have shown an urgent need for a more thorough understanding of the Single Cutter Bar Turner. For example, we found operators—experienced operators—having difficulty in positioning cutters of varying thickness in the cutter slot. The remedy is simple—a hollow set screw wrench used through the hole in the front of the block permits easy adjustment of a screw for backing up the cutter.

KNOW THE FULL POSSIBILITIES OF THIS BASIC TOOL IN BAR TURNING

THE Warner & Swasey Single Cutter Bar Turner is used more than any other tool in turret lathe setup for bar work. It is designed and built to hold close limits and deliver fine finishes under fast production. When undersized or oversized diameters occur or "barber-pole" finishes appear, invariably they can be corrected by an operator who knows how to adjust and use the tool.

To give operators a thorough knowledge of a tool they use most often and to provide definite helpful hints that will result in better bar performance, we have compiled a 32-page booklet, full of illustrations and diagrams. It will be sent on request.



New Single Cutter Bar Turner Manual Points Many Ways to Increased Production

WARNER & SWASEY
Turret Lathes
Cleveland

TO GET YOUR COPY, MAIL COUPON **NOW**

Warner & Swasey Operator's Service Bureau, Cleveland, Ohio
Please send booklet, "Better Performance from Single Cutter Bar Turners".

Name _____

Address _____

City _____ State _____

I work at (Company) _____

TE-12

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

TO ASSURE MAXIMUM BROACHING EFFICIENCY

UNIFORM PART HARDNESS *Is Essential*

Every broach is specifically designed to do one particular job. It cannot do another job efficiently. A broach which is designed to cut steel that Rockwells 15 should not be expected to cut steel that Rockwells 35. One reason for this is that the hook or rake angle of the broach varies with the hardness of the material. The hardness of the material to be cut also affects other factors of broach design such as the pitch and step.

A piece that is too soft for the broach design will tear. A piece that is too hard will dull the teeth excessively. In fact, exceedingly hard pieces or spots will completely ruin the broach. It is, therefore, advantageous to properly control the heat treatment of parts to be broached.

COMPLETE BROACH SERVICE

ARMY (E) NAVY

DETROIT BROACH COMPANY

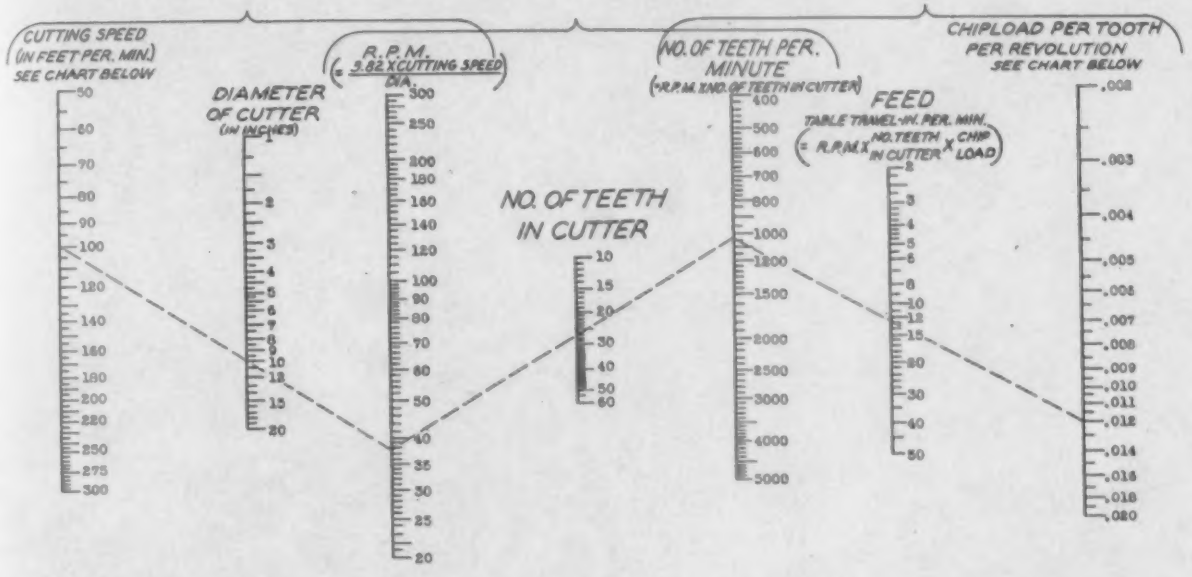
20201 SHERWOOD AVENUE • DETROIT, MICHIGAN

PRODUCTION DATA SHEET

FACE MILL SPEED, FEED AND POWER CHART

TO OBTAIN AN UNKNOWN FIGURE: CONNECT ANY TWO KNOWN FIGURES IN BRACKETS SHOWN, AND READ UNKNOWN FIGURE AT CONNECTING LINE OF INTERSECTION OF UNKNOWN FIGURE.

NOTE: The figures shown below are offered only as suggestions to determine approximate production with different types of cutters. Practical considerations such as finish desired, the condition of the material, the section or part being milled, the rigidity of the fixture or the machine, and the power available, all affect the ultimate performance.


CUTTING SPEED (IN FEET PER. MIN.) SEE CHART BELOW
DIAMETER OF CUTTER (IN INCHES)
R.P.M. (= 3.82 X CUTTING SPEED / DIA.
NO. OF TEETH IN CUTTER
NO. OF TEETH PER. MINUTE (=R.P.M. X NO. OF TEETH IN CUTTER)
FEED TABLE TRAVEL-IN. PER. MIN. (= R.P.M. X NO. TEETH IN CUTTER X CHIP LOAD)
CHIPLOAD PER TOOTH PER REVOLUTION SEE CHART BELOW

CUTTING SPEEDS

MATERIAL IN CUTTER	MED. or SOFT CAST IRON BRONZE	SOFT STEEL MALL. IRON BRASS	ALLOY STEEL HARD C.I. STEEL CAST.	ALUM. OR COPPER
H.S. STEEL	60	90	45	750
SUPER H.S.S.	75	xxx	60	1000
CAST ALLOYS	100	200	90	xxx
CARBIDE	200	250	150	1500

CHIP PER TOOTH

TYPE OF CUTTER	MAX. DEPTH OF CUT	MATERIAL IN CUTTER	CAST IRON	SOFT STEEL	ALLOY STEEL	ALUM. OR COPPER
MED. DUTY		H.S.S.	.010	.010	.010	.012
		CAST ALLOY	.010	.008	.010	xxx
		CARBIDE	.008	.006	xxx	.012
HEAVY DUTY		H.S.S.	.012	.012	.012	.015
		CAST ALLOY	.012	.010	.012	xxx
		CARBIDE	.010	.008	xxx	.015
EXTRA HEAVY DUTY		H.S.S.	.015	.015	.015	.020
		CAST ALLOY	.015	.012	.015	xxx
		CARBIDE	.012	.012	xxx	.020

HERE on one page is shown complete data on face mill speeds, feeds and power. This compilation has been prepared by R. R. Weddell of Weddell Tools, Incorporated, Rochester, New York.

Cutter speeds are selected from the tabulated chart for machining different materials with various cutting tool materials. Cutting rpm. is obtained by noting the diameter of the cutter used. The number of teeth per minute in the cut is further obtained by matching with the number of teeth in the cutter.

By further noting the chip load per tooth, which is tabulated for different materials, the actual feed may be obtained, or feed may be used for figuring chip load. Further data as to power for milling different materials is shown by comparing the number of cubic inches removed per minute with various constants shown. Qualifications in regard to operating conditions are also noted.

POWER TO MILL

CAST IRON	-- H.P. = NO. CU. IN. REMOVED MINUTE
SOFT STEEL	-- H.P. = NO. CU. IN. MINUTE x 2.
ALLOY STEEL	-- H.P. = NO. CU. IN. MINUTE x 3.
ALUM./COPPER	-- H.P. = NO. CU. IN. MINUTE ÷ 3.
NO. CU. IN. REMOVED	$\left.\begin{matrix}\text{DEPTH} \\ \text{OF CUT}\end{matrix}\right\}$ X $\begin{matrix}\text{WIDTH} \\ \text{OF CUT}\end{matrix}$ X FEED

(For further information on horsepower requirements for all types of milling operations see "Milling Cutter Power Requirements," by O. W. Winter in THE TOOL ENGINEER, October and November, 1942.)

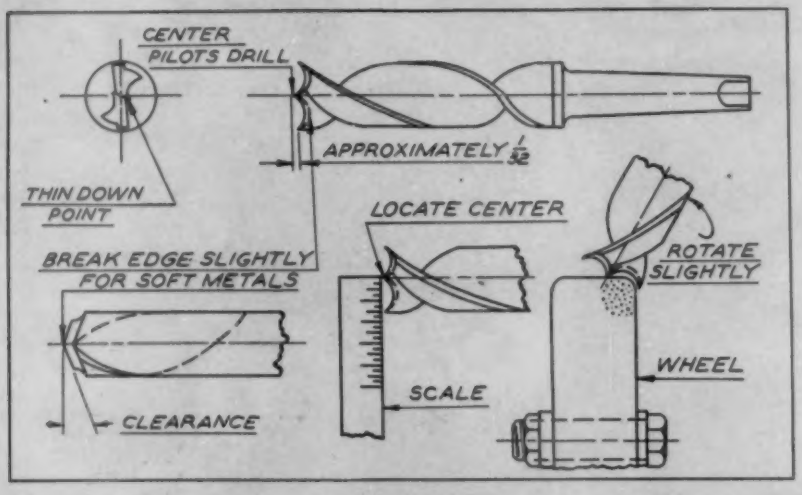
NOTE: On this page is the twenty-first of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

THE CRIB

T. M. REG. U. S. PAT. OFF.

IDEAS · KINKS · SHORT CUTS

Two Suggestions from Readers For Drilling Sheet Metals



THE USE of emery cloth between tool and work in drilling thin sheet metal was discussed in The Crib for May.

This consideration of a common problem prompted readers to send in their ideas on the subject.

Among contributors who submitted sketches for tools used for this type of work, Frank M. LaGrange of St. Louis, and M. R. Yeager developed the tools shown here.

The large drawing above shows Mr. LaGrange's suggestion. This has been used to produce holes up to ¾" in thin sheet. Holes produced are clean and similar to punched holes. The drill is easy to make, and in most cases, it is not necessary to break the cutting edges. The drill can be used effectively on soft aluminum, die castings, steel, brass and other materials, according to LaGrange.

The smaller drawing, submitted by M. R. Yeager, shows a cutting edge producted by a fine emery wheel. For smaller drills, a good wheel with sharp edges is preferable.

Larger drills grind better if the edges of the grinding wheels are rounded slightly.

Holding Close Tolerances on Heavy-Duty Drill Presses

HOLDING depth torelances of plus or minus .0015" in facing operations on heavy duty drill presses has been accomplished in one of the plants of the Westinghouse Electric and Manufacturing Company.

A collar around the spindle sleeve holds a standard .0001" dial indicator by means of an adjustable threaded bracket. A stop fixed to the spindle bracket provides a resting point for indicator plunger.

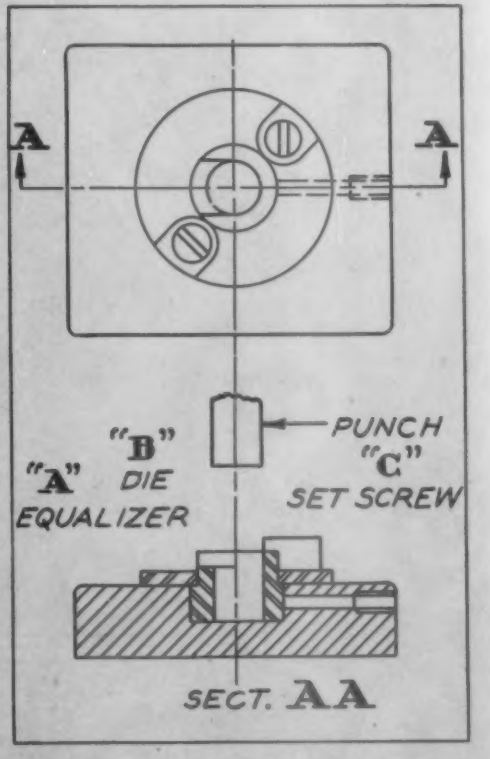
The indicator is set to read the last few thousandths of the cut. The spindle is brought to this point by power feed. The cut is finished by hand feed as indicated.

Radius Cut-off Die for Low Production Offers Quick, Inexpensive, Accurate Method

WHENEVER production volume does not warrant making a special cut-off die for cutting radius on strip steel stock, try this method.

Make a shoulder bushing "B" of tool steel, having a hole about .010" larger than the width of the strip to be cut. Mill an opening ⅛" deep, the width being the same as the diameter of the hole. Insert bushing in plate as shown and secure with setscrew "C". Use conventional punch.

Next make a locating or centralizing ring "A", having a slip fit over the neck of the bushing and two lugs with a uniform radius. Center of these lugs must be equidistant from ring center. Mount on a standard die set.



Feed strip between the two lugs parallel with the slot milled in the die bushing. Previous to each punching, have strip in contacts with the lugs to centralize the strip. Stripper plate is unnecessary. The same centralizing ring may be used for different sizes of dies within its range. Various dies may be mounted on same die set, if outside dimensions and length of bushing are interchangeable.

Need Help in TIME STUDY?

Problem: **How to build rapidly a time study force demanded by enlarged plants, incentive programs and losses in the ranks.** ***Answer:*** **Mix instructions with work, so that budding specialists gain experience while extending the judgment of experts.**

D. D. GARVEY
LABOR MEASUREMENT MANAGER
WRIGHT AERONAUTICAL CORPORATION

WHEN the Wright Aeronautical Corporation experienced a tremendous increase in production, one of the problems we had to cope with was developing the time study department to perhaps ten times its former strength. The building of additional plants, new models, substitute materials, methods and equipment, multiplied the volume of measurement to be done.

Fourteen years experience with our present labor measurement system had demonstrated that jobs on a day-work basis show a production of 60 per cent of a measured or standard day's work, and that these can be increased to 120 per cent or better with operators working under incentive. Obviously, 100 per cent increase in production would help spread existing manpower and equipment, and would certainly contribute to the over-all production program. Time study was needed to determine the standard day, and thus the point, where incentive began to show.

In establishing labor standards throughout our company's various new plants, we were seriously handicapped by the shortage of men trained for this type of work, and an influx of new, not always too well trained supervision, did not lighten our burden. Previously we had a normal turnover of time study personnel—mostly men seeking greener pastures, and under our old training system we had been able to fill vacancies as they occurred, with men of as good, or better caliber than those they replaced.

When we could afford to pick and choose among the applicants for time study work, several qualifications were considered necessary. Today, with the cream of the labor crop being diverted to the Army, Navy and Air Corps, and with even the whole milk becoming scarce, these qualifications have been relaxed considerably. Technical school training in mechanics, or engineering, with some actual machine shop experience, still gives perhaps the best foundation for time study work, but we are also taking candidates directly, from colleges and machine shops when we are satisfied as to their adaptability to our training program.

One qualification on which we are still most insistent is a personal sense of integrity in the time study man's work. We know that the successful time study man must have the respect and confidence of the operators in the shop, and no training system can supply "what it takes"—he must have that fundamental trait to begin with.

In our pre-war department, nearly every man was a qualified instructor. A new man was given certain basic reading material to study before being assigned to an instructor, with whom he remained for some months, learning by observation, asking questions, and gradually absorbing background. Each rule and procedure was demonstrated when an illustrative situation arose in actual shop practice. When the new man had "gone through the mill", we were reasonably sure that he had experienced almost every possible contingency that might arise in the normal course of his job—that everything that possibly could happen, had happened. Naturally, under such a system, the training period was unavoidably long, but with a small department, the training of an occasional new man did not offer too many problems.

The first impact of war expansion on the time study department, was the loss of a considerable number of our top-notch men to the ranks of supervision within the company, and to the military services. The loss of these men not only resulted in an extra burden of work for those remaining, but reduced the time that each could devote to instructing the many replacements, plus extra help required for expanded operations.

The effort of our key men was of necessity being spread more thinly to cover more ground. Consequently, the training of new personnel was being prolonged beyond the point of efficiency and the number of new people who could be trained at one time was decreasing.

Thus we were faced with a two-fold problem of a decrease in men and time available for instruction, and an ever-increasing group of trainees, most of them requiring more instruction than the new men taken on in pre-war days. It was evident that we must re-design our training program to avoid the danger of "Too little and too late".

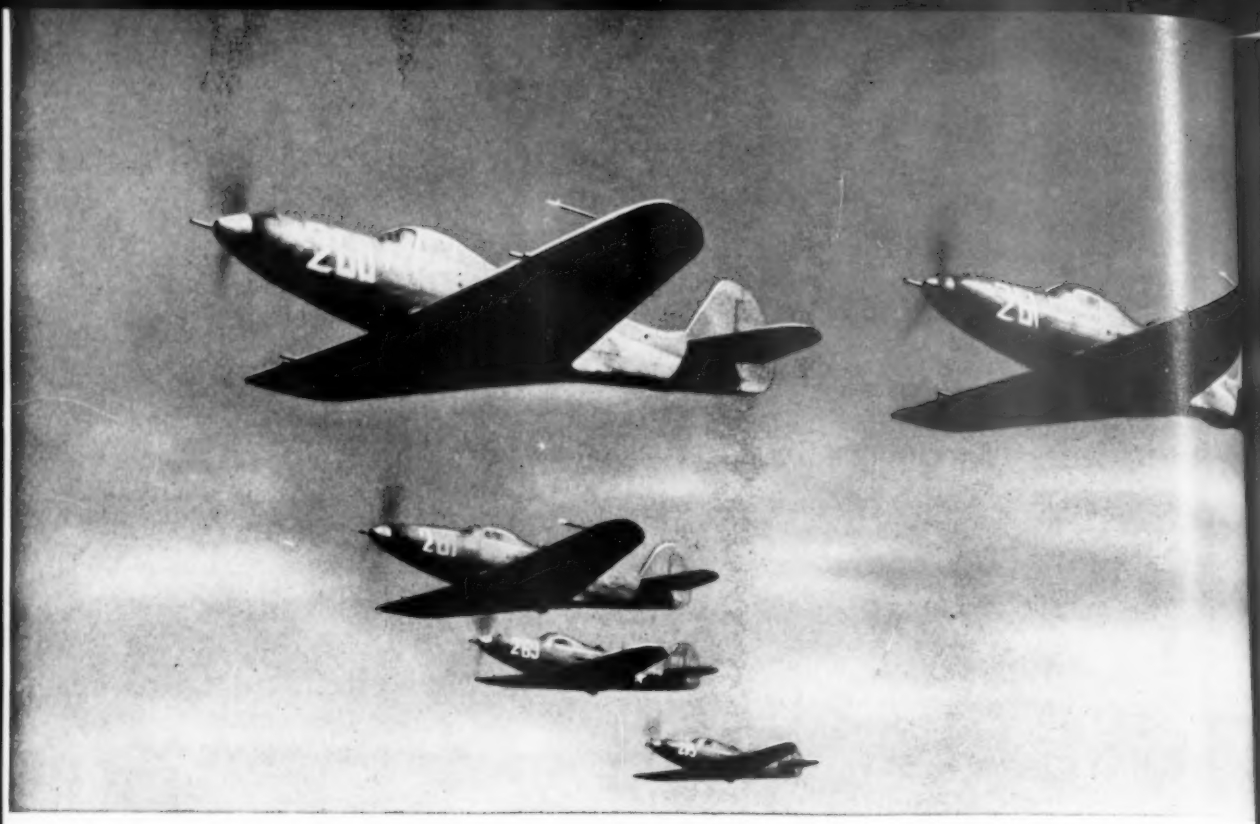
Naturally this could not be accomplished overnight, and, as a stop gap, a portion of the instruction work was turned over to our second line of defense—men relatively new in the department. But the results were not entirely satisfactory, the transmission of false ideas and errors became apparent, omissions were multiplied,

THREE RESPONSIBILITIES OF THE TIME STUDY MAN OR WOMAN

1. **Maintain the link between management and labor.**
2. **Be friendly and cooperative when questioned by operators.**
3. **Sell the cause for time study to the operator.**

● "One qualification on which we are still most insistent is a personal sense of integrity in the time study man's work . . . he must have that fundamental trait to begin with."

STARRETT TOOLS



STARRETT TOOLS

Helping to Give the AIRACOBRA its Sting!

These scenes in the plant of the Bell Aircraft Corporation give some idea of the wide range of precision measuring and inspecting work being performed by eager hands with the sureness and swiftness that tools of Starrett quality and workmanship contribute to the job.

You may be certain that the makers and distributors of Starrett Tools will keep on doing their utmost to provide the tools needed to finish the job.

THE L. S. STARRETT CO.

World's Greatest Toolmakers

ATHOL, MASSACHUSETTS, U. S. A.

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

and the "why" angle was in danger of disappearing from the instruction altogether.

A complete new training program, under a centralized control was obviously necessary. A supervisor of time study training was appointed to be responsible for developing a training program, arranging for a complete course of study and supervising all trainees. One of the important items was the preparation of a manual, or "time study bible", for the standardization of departmental methods, policies and procedures.

LECTURE SUBJECTS

Under the new system, now functioning smoothly for the past 14 months, the early part of the training period is spend in the office with occasional trips to the shop to illustrate certain points brought out during instruction. This period usually occupies two weeks, some thirty hours of which is taken up by lectures and demonstrations, and the balance in routine office work, problems and reading. During the first few days of this orientation period, the pace is leisurely, but once orientation is completed, the pace is accelerated. The lecture courses are divided into two sections, with study and practice periods designed to supplement instruction.

Throughout this time, and during the entire training program, the responsibilities of the new position are emphasized to the trainee. He is impressed with: first—the importance of maintaining the prestige of the time study department as the link between management and labor; second, the desirability of displaying a friendly and cooperative attitude when questioned by operators on matters pertaining to time study; and third, the necessity for educational work to be done in selling our cause to the operator. The urgent need for the latter has been clearly demonstrated in recent cases where new men, recruited from the shop, have come to us with many erroneous ideas and misconceptions of the principles and functions of time study.

Time study can establish normal speed for conveyor to machine movement.

Incentive payment based on group production is fair to the man who is restricted by the production capacity of his machine, as is the case with this equipment used to grit-blast Wright Cyclone cylinder assemblies. Nonetheless, there is a human equation involved in floor to floor time. Such movements are difficult to rate, but once the time study employe has acquired the skill to do so, he can be of help to both the worker and the company in establishing a standard fair to both. Here he must have knowledge of degrees of effort. A sense of tempo is important to effort rating.

The first section of lectures covers the following subjects:

1. The Time Study Job.
2. The Importance of Time Study in the Organization.
3. The Time Study Man.
4. His Relation to Labor and Supervision.
5. Method Analysis, Tools of the Trade, Element Breakdown, Clocking Technique.

The subjects of element breakdown and effort rating are taken up first. Following the demonstration of the need for rating, the trainee is taught to recognize the various degrees of effort and to relate them to normal. For this part of the training program, we are using the method as has been outlined by Mr. Ralph Presgrave* of the J. D. Woods Company, Toronto, Canada.

Using this system, we are able to start training in "rating" with a basis of experience rather than an abstract idea. The trainee is taught to relate a familiar performance to normal, by the walking practice outlined by Mr. Presgrave. All that remains is to familiarize him with our conception of a normal effort of work, and to teach him to use the sense of tempo, gained in the walking practice, and to relate observed variations to our normal. We further develop his sense of tempo by the use of a series of films illustrating actual shop operations calibrated to our conception of normal. The balance of the lecture period covering the following subjects, carries the trainee through the remaining phases of Time Study.

6. Element Selection.
7. Rating and its Application.
8. The Construction and Application of Allowances.
9. The Standard Time, its Dimen-

● Fourteen years of experience demonstrated that jobs on a day work basis shows a production of 60% of a measured day's work.

With operators working under incentive, production can be increased to 120% or better!

*"Effort Rating"—presented at the I.M.S., Chicago, 1940.

WHEN IT COMES TO FINISHING...

THERE ARE SEVERAL GOOD REASONS WHY AND AND MANUFACTURERS ARE USING "MICHIGAN" GEAR FINISHING MACHINES SO EXTENSIVELY. THEY CAN TELL YOU A LOT ABOUT THE VASTLY INCREASED OUTPUT AND THE GREATER ACCURACY OBTAINED WITH THESE MACHINES, EMBODYING THE PRINCIPLE.

IMPORTANT HOWEVER, ALSO, IS THE FACT THAT THERE IS A "MICHIGAN" TO SUIT EVERY PURPOSE. THERE IS A LIGHT DUTY 861-48 WHICH WILL HANDLE GEARS FROM DOWN TO . THERE ARE 12 TYPES OF 860'S FOR S FROM INCH TO 18 INCHES INCLUDING GEARS.

FOR MAXIMUM PRODUCTION AND LOWEST TOOL , THERE IS THE 900 SERIES RACK TYPE MACHINE. THEN YOU HAVE THE 862'S WHICH WILL FINISH GEARS UP TO TWO FEET AND THE VARIOUS MODEL 865'S WHICH RANGE IN CAPACITY AS HIGH AS 16 FT.

THERE IS A BULLETIN ON EVERY STANDARD MACHINE TYPE. WRITE TODAY ON YOUR COMPANY LETTERHEAD.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD • DETROIT, U. S. A.

10. [illegible]ns and its Meaning.
10. The Maintenance of the Standard Time and Conditions.
11. Standard Data.

These high spots, together with the connecting material, give adequate coverage of the field. In addition, the following cardinal rules, based on our own experience have been laid down for the guidance of the trainee:

1. Take nothing for granted.
2. Eliminate, combine and simplify.
3. Maintain an open mind.
4. Take care of quality (measurement) and quantity will take care of itself.
5. Judgment is the essence of time study.

Throughout the lectures, various rules and policies are fixed in the trainee's mind by means of a careful exploration of the reason behind them. Wherever possible, all illustrative examples are taken from within the experience of the trainee. We feel that this is necessary since the instruction is so intensive that every possible source of confusion must be avoided, and for the same reason, we have adopted simplicity as the keynote of our entire training system.

Following the lecture period, the trainee spends approximately three weeks in the shop with a senior time study man. It is the responsibility of this man to introduce him to shop conditions, to acquaint him with shop supervision, to explain further our conception of normal effort, to familiarize him with shop paperwork, and all the many things that occur on the floor. Here the trainee sees practical application of much of the information he has absorbed in the lecture courses. He is now given his first opportunity to try his hand at time studying and comes face to face with the degenerating effects of tight and loose standards.

Time study asks how well is the job being done? Too little or too much?

Here the man or woman rating this job will watch that a surface is covered completely, but that spray does not overlap excessively. This means that he must know the purpose of the job in order to rate equitably.

THE TRAINEE ENTERS THE SHOP

The trainee is encouraged to ask questions in order that the instructor may be able to set the pace of instruction to the individual. When these questions are not forth-coming, the instructor takes a turn at questioning.

The trainee is expected to develop reasonable skill in the use of the slide rule and to master the various formulas and computations important to our work. The end of this period sees the new man prepared to go to the shop to start acquiring a first hand practical knowledge of time study. We try to give him enough of the "why" of the job so that he will be able to work out many of the "hows" as new situations arise. We show him where to turn to when some unsolvable problem faces him.

At this point, it should be noted that the time saved in the new program does not lie in the reduction of instruction hours, but in substituting "work" for "wait" in the former long gaps between instruction periods when certain lessons were based on working out a problem in actual shop practice.

He is then assigned to a department, and after two or three weeks spent in becoming acclimated under the supervision of a senior time study man, is finally ready to begin taking time studies, still under close supervision; the degree of which depends on his individual ability.

The eight weeks training program outlined above is a result of careful study of the deficiencies of the plan it has replaced. That the old plan was a sound one, under the conditions in which it functioned, cannot be denied —but like the village blacksmith shop, it died a slow death because it was not adaptable to mass production. We believe the value of our earlier system is evidenced by the rather impressive array of top men in our organization who have advanced from the time study department.

We do not claim to produce finished time study personnel in eight or nine weeks with our streamlined training program, but we do turn out the basic material for a specialized man or woman. The clay we have mixed and moulded, and all that is needed is that it be aged by experience. This aging takes time, but we are confident that the brick will be up to specification and that it will match its more seasoned brother when the aging process is finished.

THE END.

The creature no one knows...

IN THE HALF-WORLD between day and night, an eerie, sinister creature emerges from hiding. Its ancestry is unknown. It is the bat, the only mammal which flies. Of all the creatures known to man, bats are the most mysterious. They do not mate when other animals do. And no one knows where they go at migration time.

Yet bats are the most highly specialized mammals on earth. If we had the intricate ears of bats, we could hear an ant walking. If we had their incredible coordination, we could fly at the speed of a locomotive toward a telephone wire...at dusk...yet miss it! Or dash blindfold around hundreds of objects and not touch one!

But if you think **that's** specialization, listen to this: The production giant of the machine tool industry – Cone's multiple spindle automatic lathe – can do as many as 8 different jobs simultaneously...in a matter of seconds...or perform as many as 17 different operations on a part – more than one every two seconds – with the deftness of a master craftsman!

The prime task of Cone Automatic Machines today is to help speed war production. In the future, by making possible increased production, they will increase purchasing power...and so increase employment. As a result, Cone Automatics will make major contributions to social and economic gains of the future.

CONE Automatic Machine Company, Inc., Windsor, Vermont

Relieving the need for special tooling, attention to design of cutting tools gives the shaper flexibility.

"Know-How" on VERTICAL SHAPER

THE FLEXIBILITY of the modern vertical shaper is well brought out in the shaping of large keyways in heavy or cumbersome pieces. An application illustrated here shows a method of roughing and finishing two 2½" x¾" keyways in cylinder barrels used for the hydraulic control of a large caliber gun. These barrels are forgings about 24" in diameter and 10⅜" high of SAE 4615 steel, normalized and annealed. Specifications called for a smooth finish on the bottom of the keyway to within a limit of .001" from the hole center. The sides were to be smooth and the width of the keyway held to within .001" overall and central with the hole.

One roughing tool was used. For finishing two different tools were used, one for the bottom, and another with two tool bits for the sides. All bits were of Stellite. It was found economical to resharpen the tools once after every 10 pieces.

Accurate, smooth surfaces

The roughing tool was similar to the bottom finishing tool, except that its edge was straight. The bottom finisher has a relieved portion in the middle of the cutting edge, leaving two ⅛" wide cutting edges projecting. This prevents "digging in". Thus a smoother and more accurate surface was assured. It is important to note that this tool, as well as the rougher, was given additional support by means of a rib welded to the tool holder.

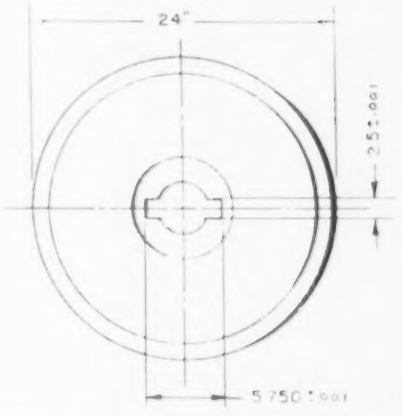
A double bit tool was used simultaneously in finishing both sides of the keyway. It is important to note that the cutting edges of the tools were kept relatively narrow to insure a good finish. In general, it is found that the longer the tool holder, the smaller the cutting edge of the tool bit must be in order to obtain smooth and accurate cutting.

In this case it was found more convenient to apply the coolant directly to the cutting points at the top of stroke by means of two jets.

The shaper was set for a stroke of 8". Roughing was at 19 strokes per minute with a feed of .012 per stroke. The finishing speed was 31 strokes per minute and .002" feed per stroke. Each block was finished completely (2 keyways) in six hours.

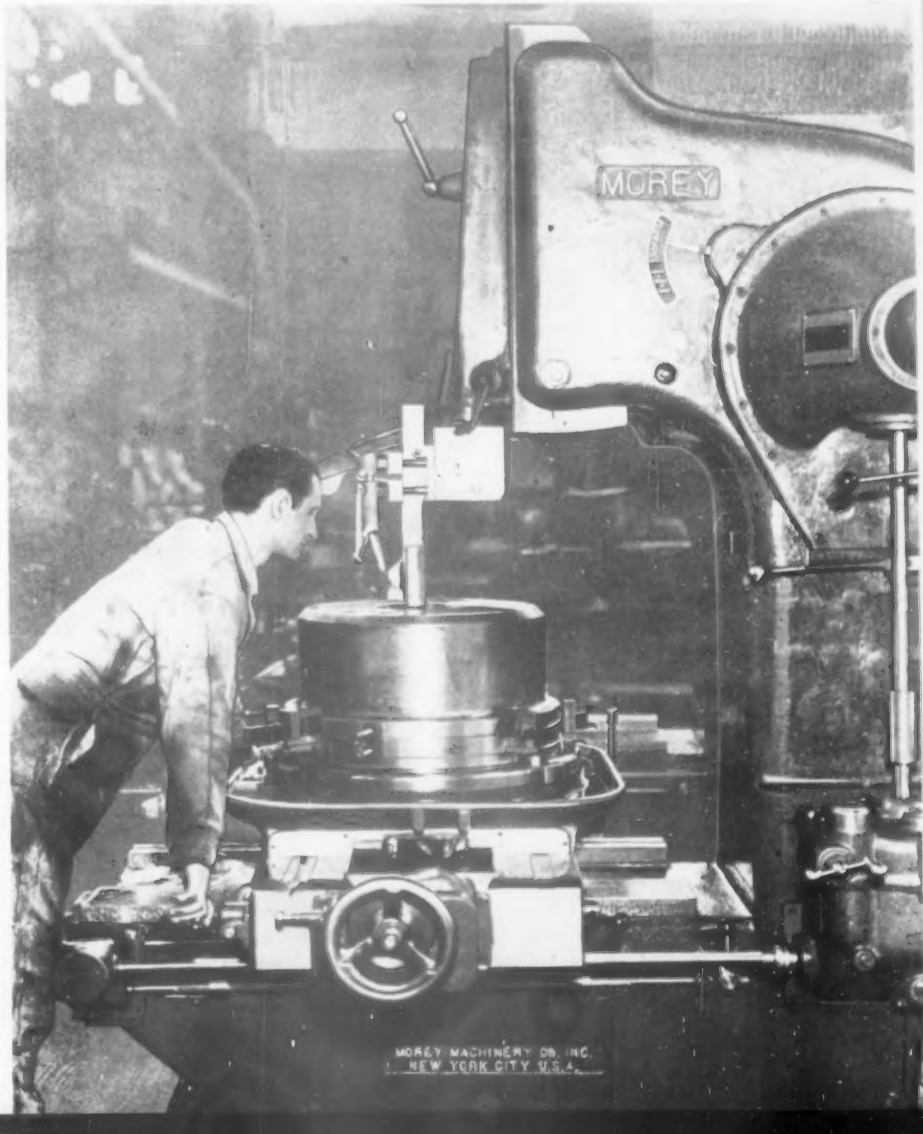
THE END.

•

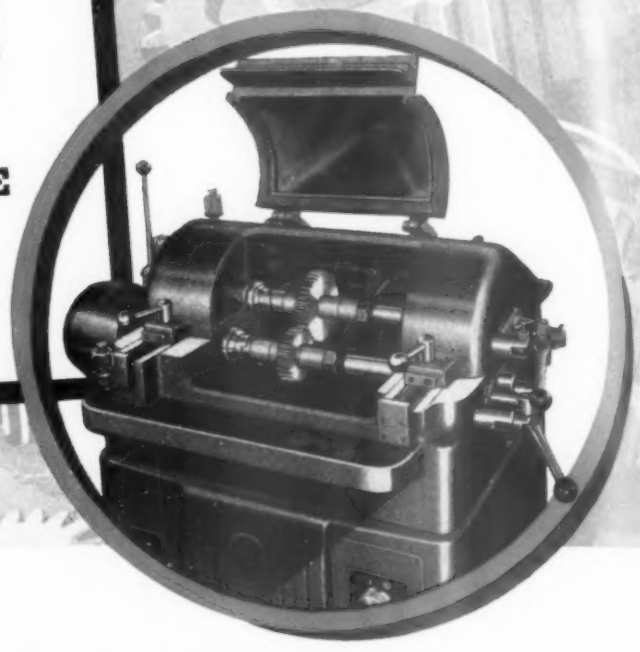


Right: **a deep keyway accurately cut without the need of special tooling.**

Below: **cutting two precision keyways on production with 14" vertical shaper.**



FIND OUT WHETHER GEARS ARE NOISY *before* THEY ARE ASSEMBLED



The RED RING Gear Sound Tester will tell you immediately whether any pair of gears will be noisy in operation. By the character of the sound noisy gears produce at various speeds, you are able to diagnose the cause of their noise and provide a remedy.

The RED RING Gear Sound Tester consists essentially of a sound chamber in which the gear set being tested operates, and a special acoustical horn which amplifies gear sound fifty times. The sound chamber excludes outside sounds so that the inspector hears only that made by the gears inside. For that reason it may be used anywhere, even in a noisy shop.

Gears may be tested under light brake loads at four speeds and in both directions of rotation. The center distance between test gear spindles is adjustable and set with precision gage blocks.

SPECIFICATIONS

	GSC-10"		GSLX-18"	
APPROXIMATE CAPACITIES	**SOLID SPINDLE**	**HOLLOW SPINDLE**	**SOLID SPINDLE**	**HOLLOW SPINDLE**
Maximum Gear Diam.	10"	10"	18"	18"
Max. Length between Centers	11"	11"*	14"	14"
Distance between upper and lower spindle	1¾" to 5½"	2½" to 5⅝"	3¼" to 10¾"	3¼" to 10¾"
Gears with Stems		½" to 1½" Dia. of stem		½" to 1⅞" Dia. of stem
Spindle R. P. M.'s with Standard pulleys	500, 800, 1050 and 1600		750, 1150, 1550 and 2300	
Net Weight	1200 lbs.		2040 lbs.	

**Can be varied to suit individual requirements. (Consult Engineering Dept.)*

Write for descriptive bulletin.

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

NATIONAL BROACH AND MACHINE CO.
RED RING PRODUCTS
5600 ST. JEAN · DETROIT, MICH.

Patterns for Survival

WALLACE A. SCOTTEN
ASSOCIATE EDITOR

IN certain segments of industry there is a feeling that post-war planning now is somehow premature, the wrong use of time and unpatriotic. "Don't cross your bridges until you come to them," some say. "Let's devote all our energy to winning the war first," a few production engineers and industrial leaders will tell you. Yet many men vested with the responsibility of operating this greatest of all productive machines in history and providing employment necessary for maintaining the American standard of living think otherwise. They agree we must win the war, but point out that we had better build a few bridges today, because we have a very deep river to cross once the word of final and complete victory is flashed around the world.

History has taught some hard lessons on this subject—business depressions, industrial stagnation and unemployment. But history also records that no organized effort ever was made in time to lay the foundation for a sane return to a post-war economy.

Today, in the firm faith that the wheels of industry can be made to turn at a faster pace than ever before in peace time, that all those things for which men are dying today can be achieved, both government and private enterprise have endorsed post-war planning. Notable groups of farseeing, hardheaded industrialists are striving to evolve a post-war program visualizing greater production and greater employment than the nation's zaniest visionaries ever contemplated.

Will we welcome home our soldiers and sailors to closed factories—plants shut down while management struggles with the problems of product design and production engineers with the problems of shop conversion?

To make the answer a definite "no" is a gargantuous undertaking. Now at work on that undertaking are some of the country's best brains. A dossier of the notable groups now at work on the problem would fill columns. Indicative of the caliber of these groups, and of the men at work in this field, are the liberalized Chamber of Commerce of the United States, the National Association of Manufacturers, and the Committee for Economic Development. The latter under the leadership of Paul G. Hoffman, president of the auto industry's Studebaker Corporation, has provided some concrete material on the basic post-war goal American industry must achieve if it is to fulfill the demands the nation inevitably will make upon it.

"Winning the war is our first job," production and sales-wise Hoffman says. "But winning the peace must not be neglected. To assure a satisfactory level of employment, America must provide in the neighborhood of 56,000,000 jobs in the post-war period.

"To achieve this employment objective, the nation must provide and sell an annual output worth between 135 and 150 billions of dollars, 35 or 40 per cent above the previous maximum of about 100 billion dollars worth of goods and services in 1940.

"These objectives can be reached and new jobs created in sufficient numbers provided a substantial majority of American businessmen begin to make their post-war plans now, and provided an environment favorable to business enterprise prevails."

There is the problem and the goal. How to achieve it? As part of its post-war program, every factory must plan to provide as many good jobs as possible. To provide good jobs, a factory will have to compete successfully in the peacetime world and on a world-wide basis.

To compete successfully means that goods must be provided at a cost low enough to attract buyers. And to keep costs low, workmen must be provided with every new method, machine and material for eliminating waste and keeping down cost-per-piece.

Yet before the production engineer can visualize his post-war plant he must know what he is going to build, how many units and of what materials. In this, he must work with management, with the sales force of his organization. If he fails to enlist the aid of management in post-war planning now, or if management fails to confer with him now, either or both will face a difficult fight for survival on Reconversion Day.

• If post-war planning is to succeed, it must start in the factories and shops of the nation. The industrial leaders now engaged in this work admit that they are endeavoring only to stimulate thinking among the men who will operate the machinery with which a better world for tomorrow will be built. To enable production engineers and management to do some practical thinking, actually to plan rather than speculate, some fundamentals on post-war planning are presented here.

—The Editors

BALANCE SHEET OF POST-WAR CONDITIONS

•

EMERSON P. SCHMIDT

ECONOMIST FOR COMMITTEE ON ECONOMIC POLICY
OF CHAMBER OF COMMERCE OF THE UNITED STATES

ASSETS

1. Reduction of Private Debt
   - a. Farm
   - b. Mortgage
   - c. Installment Sales
   - d. Insurance loans
   - e. Open book accounts
   - f. Etc.
2. Reduction of State and Local Debt
3. Accumulated Private Purchasing Power
   - a. Savings banks
   - b. Insurance policies
   - c. Government bonds
   - d. Home ownership
4. Requirements for Foreign Rehabilitation*
   - a. Food and clothing
   - b. Animal feeds
   - c. Breeding stock
   - d. Machinery and equipment
5. Unemployment Compensation Benefit Rights
6. Deferred Demand*
   - a. Decrease in inventories—retail, wholesale, manufacturer and consumer
   - b. Consumer semi-durables — example: clothing
   - c. Consumer durables—example: housing and motor cars
   - d. Deferred maintenance of consumer and producer properties
   - e. Family formation
7. Technical Shifts Requiring New Capital; example—development of plastics and light metals*
8. Prospect of Avoiding Inflation
9. Growing Public Awareness of the "Role" of Business and Industry in the Economy
10. Trained Labor Supply and Know-How
11. Public Works to Take up Slack

LIABILITIES

1. Delay of Reconversion to Civilian Production
   - a. Disposition of Government contracts and supplies
   - b. Conversion a time-consuming process
   - c. Scarcity of raw materials
   - d. Equipment
   - e. Wait-and-see attitude due to new materials
2. Taxes and National Debt
   - a. Effect on Working capital of business
   - b. Costly task of reconversion
   - c. Taxes and cost-price relationship
3. International Trade Uncertainties
4. Problem of Sustaining Investment in a High-Income Economy
5. Absorption of Total Labor Supply into Production
   - a. Expanded labor supply*
   - b. Expectations raised by wartime wages
   - c. Plant and industry-wide collective bargaining assumes no responsibility for absorption of total labor supply
   - d. Effect of high wages on mechanization*
   - e. Payroll taxes on employer a tax on demand for labor
   - f. Annual increase in labor supply about 700,000 workers
   - g. Necessary investment per job
   - h. Cost-price relationship
6. Maladjustments in Price Structure
   - a. Wages
   - b. Farm prices
   - c. Other raw material prices
7. Government by Blocs and Pressure Groups
8. Lack of Unity as to Future Political and Economic Structure

*Some "Assets" may be liabilities in terms of potential production; likewise, some "Liabilities" are advantages. Here, however, we are concerned with solving the problem of re-employment and getting civilian production under way soon after the war.

Before much can be done on post-war planning for an individual industry, some conception of post-war economics and product potentialities is necessary. Views on this subject vary widely, but most progressive industrialists are now firmly convinced of the axiom that you can "fret the country into another depression."

Consequently, from huge industrial laboratories to the smallest corner shops, men are putting together blueprints, or at least day-dreaming, of what peace will bring. As Paul Hoffman puts it, our engineers are commencing to "guesstimate" on how full production can be achieved.

One of the most proved and reliable public opinion polls reports that 71.7 per cent of Americans believe that "American industry can create" expansion and opportunity, while only 13.1 per cent believe the "great age" is over. That should dispell fear of public apathy and mental stagnation.

How thoroughly business and production men, who must help create full post-war production and employment, have come to favor planning "right now" is indicated in an authoritative survey which sent questionnaires to more than 30,000 such men. Ninety-seven per cent of the replies urged immediate planning, although only 76 per cent reported acting now.

Replies to the same survey indicated that more than one-third of the nation's manufacturers have no intention of continuing de-frilled standardized items, although they confirmed reports in this magazine from leading automobile makers that the first post-war models will be substantially prewar models.

Industry expects, this survey showed, to finance its reconversion independently, from reserves, from post-war payments on war contracts and from tax credits. Those needing money plan to go to the banks rather than to the Government; few plan new security offerings. Lowered tax rates seem to be the most desirable aid the Government can offer.

The big question mark in post-war planning is the public reaction to accepting products of prewar design, its anticipation of new products developed from war-time discoveries in methods and materials.

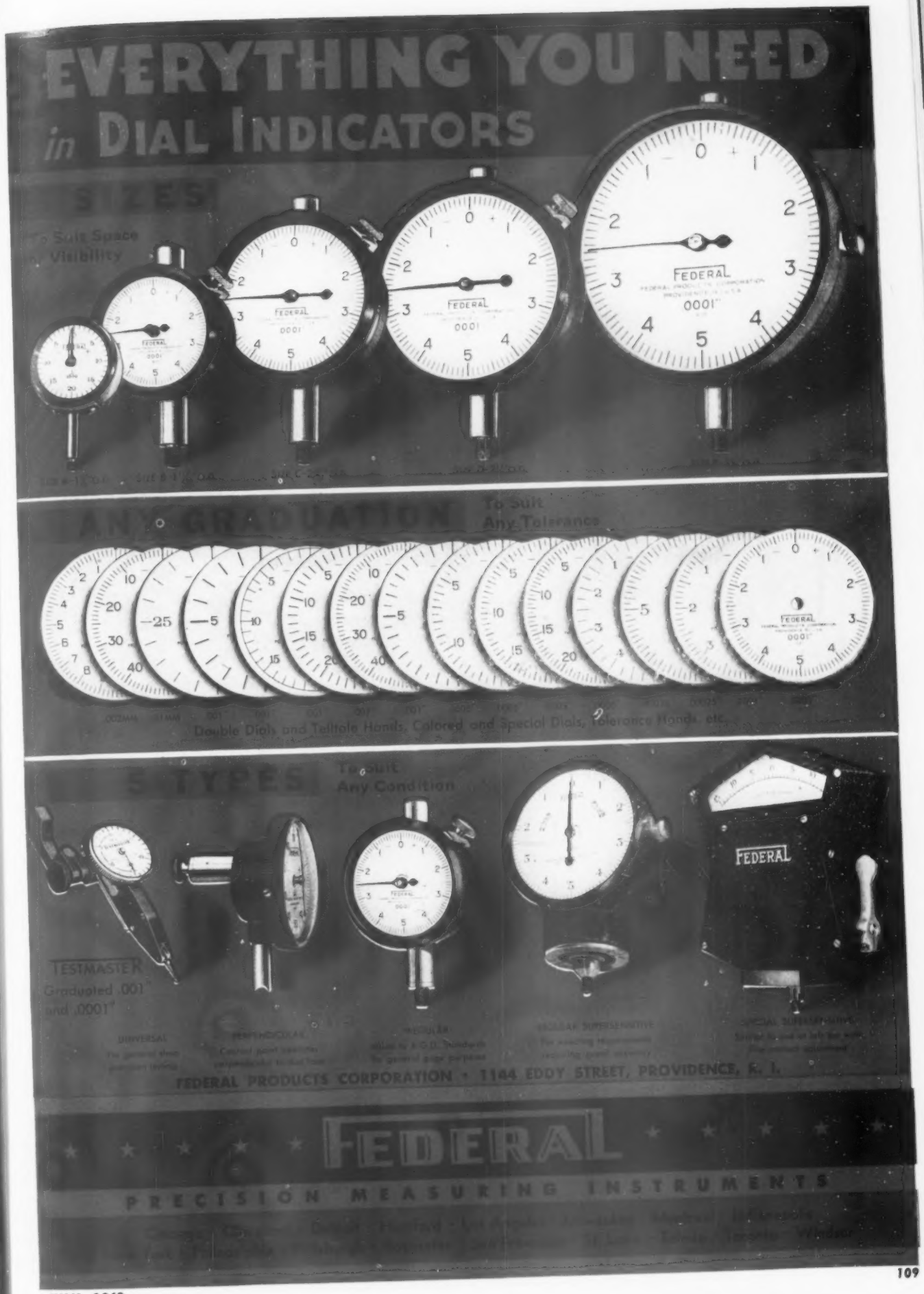
HOW TO GET STARTED

Although every industry and every company may have its own objectives, there are certain fundamentals that apply to all planning to be undertaken. In order to offer its readers — shop men and management — a basic plan for procedure in planning, Bramson Editors went to a man active in setting up planning programs in industry today. He is Fred L. Black, engaged in stimulating industrial post-war planning, and formerly of the Ford Motor Company and the United States Department of Commerce. Long associated with industry and as a close associate of Henry and Edsel Ford, he became familiar with the problems of product design for mass manufacture and was a key executive in merchandising more than one million cars and trucks annually.

Here, substantially, is the way Black has proposed post-war planning for individual industries including machine tool manufacturers and mass producers of metal and synthetic products.

From the day you start planning, one individual in your organization

(*Continued on page 111*)


EVERYTHING YOU NEED
in DIAL INDICATORS
SIZES
To Suit Space
Visibility
FEDERAL
0001"
ANY GRADUATION
To Suit
Any Tolerance
Double Dials and Telltale Hands, Colored and Special Dials, Tolerance Hands, etc.
TYPES
To Suit
Any Condition
TESTMASTER
Graduated .001"
and .0001"
FEDERAL PRODUCTS CORPORATION • 1144 EDDY STREET, PROVIDENCE, R. I.
FEDERAL
PRECISION MEASURING INSTRUMENTS

PULL HERE
HOLD HERE
DOALL
PRECISION SAWS
FOR CONTOUR SAWING OF ALL METALS AND OTHER MATERIALS
IMPORTANT
To get best results use the correct saw and the correct cutting speeds for each job.
Consult a DOALL Job Selector Dial or Saw Booklet.
PRECISION BAND SAWS
LOOK FOR THE TRADEMARK
THE DOALL CO.
DES PLAINES, ILLINOIS

THE RIGHT SAW FOR EACH JOB

● Using the proper band saw means saw life is doubled and trebled in many cases—jobs are finished quicker and smoother.

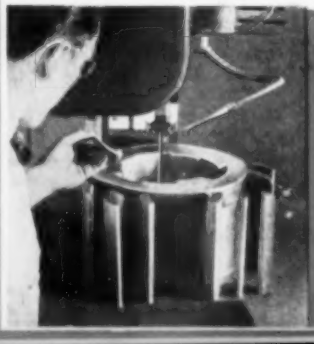
Use only DoAll Band Saws according to the DoAll Job Selector and save money and man hours. Right now that's not only patriotic, but good business. With the Selector Dial anyone can tell instantly the right saw and speed for each kind of material.

FREE SAW CLINIC—If you have an unusually tough job that is slowing down production or ripping out saw teeth, send it to our Laboratory for free analysis and written report. Or, consult our factory trained engineer in your locality for valuable aid right in your own plant on your own work.

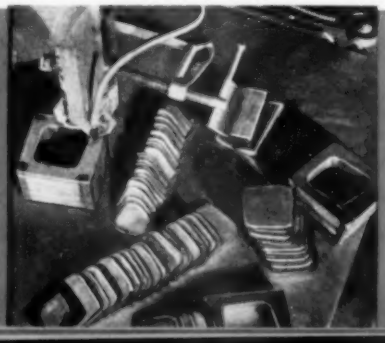
Send for new book "DoAll Precision Saws". Lists styles and sizes of DoAll Band Saws and gives case histories of various hard-to-saw jobs. You'll find it interesting and helpful.

THE DOALL COMPANY
1211 Thacker St., Des Plaines, Ill.

DoAll Offices in 25 cities, each in charge of a trained sales engineer to give you quick service on Band Saws and Files, Contour Machines, Gage Blocks and Surface Grinders.



FORGED STEEL GUN BREECH
7⅛" high. Sawed with a ⅝" saw. A temper, 8 pitch, .042" Raker set. Speed, 125 f.p.m.



STACKED METAL SHEETS
Two stacks 3/32" thick, 30 pieces were completed with the right saws in 1½ hours.

DOLI LOCK PARTS
To save material, parts were laid out in pairs. Each pair was finished in 5.62 minutes.

(Continued from page 108)

must assume the responsibility of heading a post-war committee, must preside and act as historian of all activities related to planning.

Who will that individual be? Case histories of planning in large and small industries indicate that a man familiar with manufacturing and merchandising is best suited for the position. If a choice is to be made, experience in market demands and reactions is generally best. Production men, generally, are expected and do produce what the sales department finds the consumer wants in a product.

Once selected, the man will want to move slowly and receive the cooperation of management and production in recording in a permanent data file the opinions, hopes and anticipated abilities of the concern — from the president down to the hourly-rated shop employee.

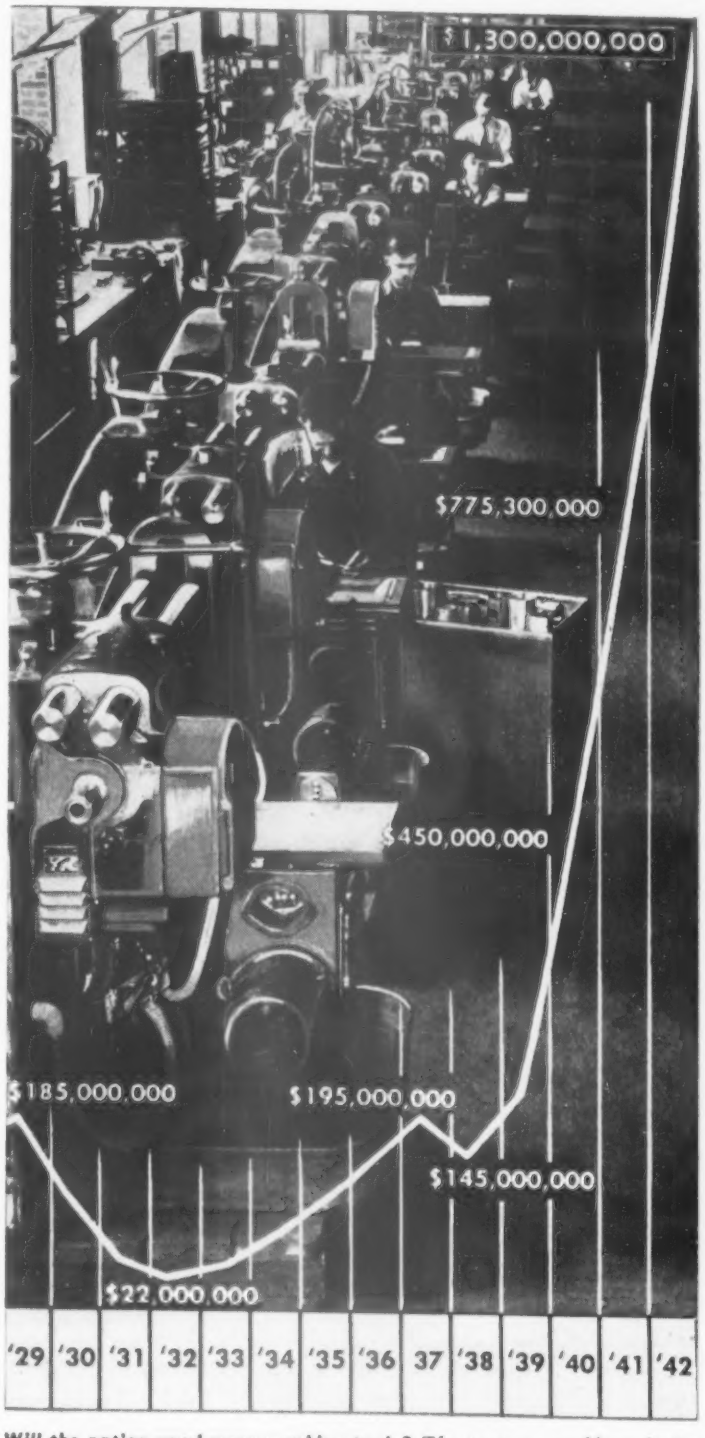
BUILD YOUR PLAN ON PAPER

Before work on the project is commenced, it must be agreed that the plan will be built on paper, changed month by month as the many factors affecting it change. It must necessarily be a plan covering everything from financial structure after war contract cancellation to existing and available production machinery.

Management and production executives, in committee, should record and review changing factors at least once a month. When the war ends they will, at most, never be more than a month behind in their planning. They will have amassed invaluable material that it otherwise would be necessary to gather while conversion of plant facilities waited.

A post-war objective is fundamental. Insofar as possible, this objective should be quantitive. For example, if your firm did a $100,000 business in 1940, the last peacetime year, when the national income was 100 billion dollars, it might be assumed that a fair volume objective in a post-war year with a national income of 150 billion would range between $135,000 and $150,000.

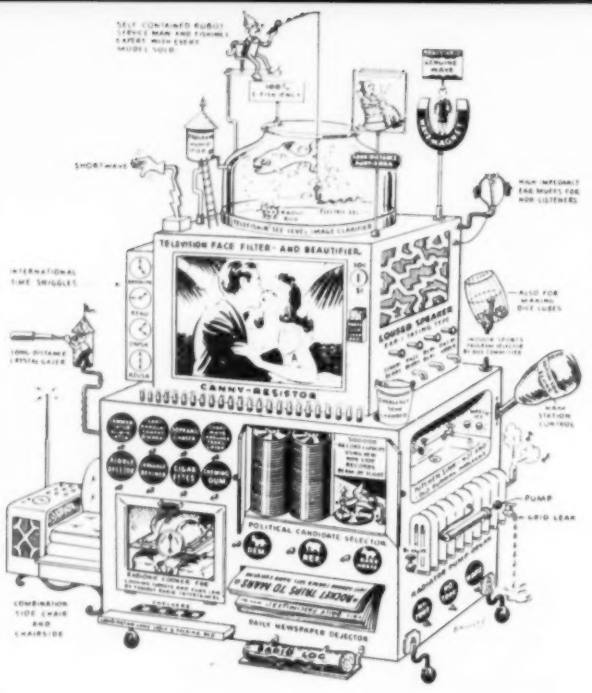
The determination of these factors leads to planning in terms of physical facilities and machinery, organization and finance to maintain such a volume of production. Some of the facts which may be set down will be the amount of war-time facilities useable, the possible need for change in plant layout or location, cost of materials and operation until revenue from normal production is realized, number of employees and extent of training necessary to prepare the entire organization to meet new market and manufacturing conditions.



Will the nation need more machine tools? *The post-war problems facing industries whose peacetime and wartime products are similar are well dramatized by this graph of machine tool output.*

In building the plan on paper, it must be divided into periods or stages in accordance with the relation of one activity to another in business operation.

No plan, however good, is worth the



Production engineers will not begin building radically new peacetime products as satirized by Zenith Radio Corporation in this cartoon of promised post-war television.

Post-War Production Outlook

●

ALFRED P. SLOAN, JR.

CHAIRMAN, GENERAL MOTORS CORPORATION

I am an advocate—a strong advocate—of planning for the post-war period. And now! But subject to one condition —that it does not prejudice the war effort. I can not believe that the real objectives of the war effort for which we and our Allies are making such great sacrifices will be attained by merely winning the war. I believe we must also win the peace.

We will all do a better job for both ourselves and the economy as a whole if we prepare aggressively and intelligently now. We must face the job sooner or later. In thus planning, we should attempt as best we can to appraise all the factors, uncertain as they may be, that will apply in each individual set of circumstances.

Now the question arises, what do we look forward to in industry when the war is over and we get back to our peacetime activity?

It seems to me clear that the first five or six months we are going to have a period of uncertainty while we are moving from a war economy to a civilian economy. It seems to me clear that after that is finished, we will have two, three, maybe four years of intensive industrial activity to make up the shortages.

As a matter of fact, it is our belief in General Motors that we could probably sell our normal peacetime capacity of about 12,000 cars a day. I think we feel from an economic standpoint and the standpoint of purchasing power and demand, that we could probably increase that capacity by fifty per cent. I think that we could move for quite a protracted period, 18,000 automobiles a day. That, of course, applies to us in automobiles and it applies to other things. I think it applies generally to all forms of consumer goods.

Tool Engineering and Post-War

●

RAY H. MORRIS

PRESIDENT, AMERICAN SOCIETY OF TOOL ENGINEERS

Not so distant is the day when the Tool Engineering profession will be called upon to do as big a job for Peace as it has for War. And, I think, they will make the changeover to post-war production in substantially less time than they required to tool the thousands of American and Canadian factories for war production. This belief is based on the fact that industry will be on a competitive basis in the post-war period, free from necessary, but arbitrary Governmental regulations.

Numerous concerns already know what products they will offer the public when war is over. Many of these products will involve new materials demanding new methods of manufacture. Existing equipment will be utilized to a considerable extent, particularly the basic types of machines. I foresee, however, the development of special purpose machines for the manufacture of certain consumer commodities to reduce costs and achieve a competitive position with world-wide industry.

Because war production schedules are based on tremendous quantities per piece, I think that industry in turn will tool wherever possible with mass production in mind. Buying power now being pent up will make the craziest dreams of mass production come true.

Tool Engineering in all its ramifications will emerge as a recognized profession in the post-war world. I have heard many manufacturing executives express the opinion that a Tool Engineer is fully as indispensable to industry as the Development and Research Engineers who design and create new products.

Designing and research should go hand in hand with Tool Engineering in post-war mass production. They should be considered a part of industry's overhead because no article designed for a mass market can be produced economically without the work of a Tool Engineer.

● Stimulated by war production demands, machine tool output has skyrocketed from a depression low of $22,000,000 to an unbelievable $1,300,000,000 last year.

No segment of industry faces more serious post-war problems than the builders of those machines.

Tell Berna discusses this phenomenal production and the outlook for peacetime machine tool production on page 116.

effort of developing unless it is properly implemented and put into action. And no plan can produce maximum results unless it is constantly adjusted to changing conditions. It must be brought out for periodic examination and review.

The post-war plan coordinator will want occasional and informal sessions with representatives of the various divisions of the firm. After a few such sessions he will have on paper the most important requisite of planning, namely a set of objectives.

As background for planning, there are a number of points worth mentioning. Whether the business enjoys a foreign or domestic market, or both, management should be conversant with trends in U. S. Government policy on trade and tariffs.

(*Concluded on page 114*)

A NEW TORQUE WRENCH

An Important Development in the Hand Tool Field

The New Livermont Torq-Snap Wrench can be used efficiently in total darkness and in noisy areas as well—inside a wing, hull or semi-dark hangar—on the flight ramp or on the field with engines running.

When the proper predetermined torque load is reached, the Torq-Snap gives both an audible "click" and a definite physical sensation which is transferred to the operator's palm. *No visual attention is necessary.* No dials or battery operated indicators are involved.

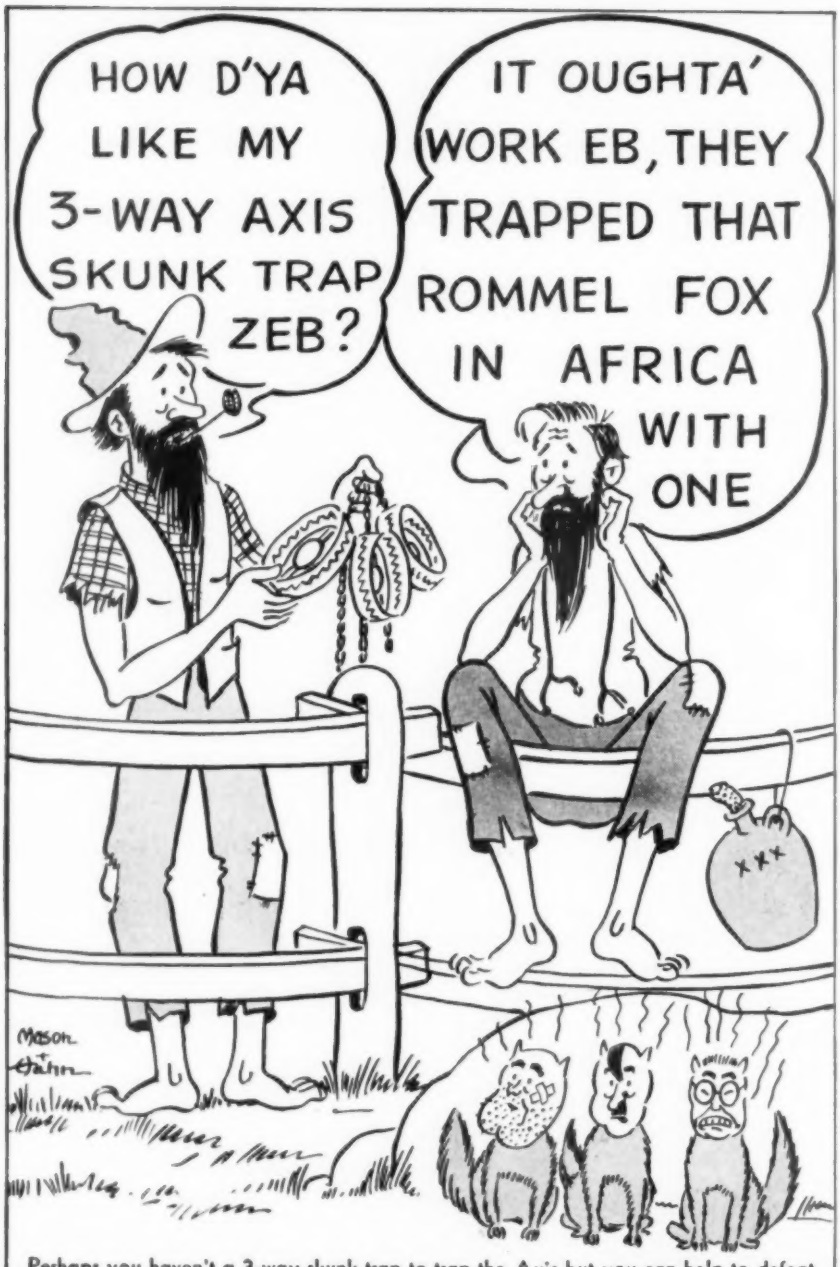
Simple in design, this new torque wrench works on the principle of spring bar deflection. The deflection in the main bar bends

a secondary spring which snaps over center when the proper load, for which the wrench has been pre-set, is reached.

The Livermont Torq-Snap was developed for one of the largest aircraft manufacturers to apply proper torque loads in aircraft plumbing—and it has passed exhaustive tests. It operates within a very close tolerance and eliminates hazardous variations formerly unavoidable in vital aircraft plumbing connections.

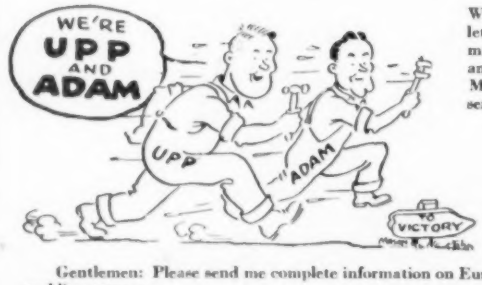
Twelve sizes are available with open or box ends, either offset or straight. Write for complete specifications (on your firm letterhead, please).

TUBING SEAL-CAP, INC.
215 W. 7th STREET, LOS ANGELES
East. Representative, 428 New Center Bldg., Detroit
"CLICK"



Perhaps you haven't a 3-way skunk trap to trap the Axis but you can help to defeat this murderous trio in conserving vital tool steels by welding your broken tools and dies with EUREKA Tool Steel Electrodes. We also feature the "SUTTONIZING" welding process for restoring your high speed cutting tools in our own plant.

WELDING EQUIPMENT & SUPPLY CO., 223 Lieb St., Detroit Michigan



Why not be Upp and Adam too—by letting us outline your tool and die reclamation program with Eureka Electrodes and the "Suttonizing" welding process. Merely fill out the coupon below and send today.

WELDING EQUIPMENT
& SUPPLY COMPANY
223 Leib Street
Detroit, Michigan

Gentlemen: Please send me complete information on Eureka Electrodes and the "Suttonizing" welding process.

Name..... Title.....
Company.....
Address.....
City..... State.....

News of Federal, state and regional planning board activities should be scrutinized. There is a lot of such work going on and some of the material developed by these organizations may be basic to the problems.

Do you investigate the reports of permanent Government agencies, notably the U. S. Department of Commerce? What about plans for Federal post-war development of dams, highways or agricultral projects? They may affect very materially the sale of your products.

Miracle worker Henry Kaiser will not build all the dams, bridges, ships, planes, automobiles and prefabricated homes. Find out who the others may be in the basic industries.

One of the best sources of material for planning are the district organizations of the Committee for Economic Development. By cooperating with this group of experienced industrialists and businessmen you may go a long way toward keeping your plans up to date.

Chambers of commerce are beginning to move into the picture. They may ask your cooperation. Give it, for you will be asking for their assistance later.

You certainly should cooperate with your own industry associations. Production executives should report on the activities in their own association groups.

GATHER AUTHORITATIVE MATERIAL

Having set limits to the fields of production into which your manufacturing operations will reach, watch for articles and other informative material closer to fact than fiction. Engineering is based on fact so this should not be hard to do. Your department heads, being experts in their own fields, can help your post-war plan coordinator appraise the value of such material as well as bring items to his attention.

Whether you are a shop man or an office man, you should know and understand the nation's fiscal and sociological problems. Watch for places where your organization, your plant, your services and your technical personnel fit into the most reasonable view of things to come.

Do these things with care and intelligence and, come what may in post-war technology, you may build a workable pattern for survival.

THE END.

THIS IS THE WHEEL MR. JONES*

● Maybe you were stumped by grinding jobs before, but they won't worry you any more.

300 shapes and sizes—every grade and grain—there is a Chicago Mounted Wheel custom-built to take on *any* grinding problem. Each wheel is a whirling point of power that turns your jobs out smooth—and in a hurry.

PROMPT DELIVERY

Action is the keynote from the moment your order comes in. Our wartime set-up concentrates on mounted points and grinding wheels 3" in diameter and under. —Production is stepped up and keeps pace with demand. Another advantage to you is our central location.

NEW CATALOG—Shows Chicago Mounted Wheels in actual colors, also portable electric tools and time-saving accessories.

CHICAGO WHEEL & MFG. COMPANY

America's Headquarters for Mounted Wheels and Small Grinding Wheels.

1101 W. Monroe St., Dept. TE-7
Chicago, Illinois

*Half a century of specialization has established our reputation as *the* small wheel people of the abrasive industry.

TEST WHEEL FREE—Tell us the job, type grinder and size wheel you use and we'll send one prepaid.

☐ Send Mounted Wheel Catalog
☐ Free Wheel. Size .....
☐ Also interested in Grinding Wheels

Name .....

Address .....

**Tell Berna, General Manager,
National Machine Tool Builders' Association**

"There need be no doubt about the way machine tool builders will meet this situation".

Machine Tools and Post-War

Machine tool builders are now converting to the production of other war materiel. What about post-war? Such improvements in machines will be made that American industry will not be able to resist buying them, says Tell Berna.

IN A SENSE, this war is three wars in one. The first war is the war abroad on sea, land and air and that we know is in competent hands. The second war is the war at home against selfishness and carelessness and greed. The third war is the fight to establish a post war world of the kind that we want for ourselves, our children and our childrens' children.

These three wars are so closely connected that unless we win all three of them, we will not have won any of them and in each one of them the tool engineer and the machine tool builder may play a part.

It was apparent when the United States began to give thought to preparing for the possibility of a world war that the machine tool builder would play a very important role in preparing for that struggle. It is amusing now to look back on the efforts that were made at that time to estimate the volume of machine tools needed and to remember that it was thought that $300,000,000 worth of machine tools would probably equip this nation for an all out war effort.

As a matter of fact, the machine tool industry and the American airplane engine industry entered this war before the United States officially opened hostilities, and the 1939 output of machine tools worth $200,000,000 was rapidly increased to an output in 1940 of $445,000,000. Already we had far exceeded the original estimate of $300,000,000, but it was apparent that the task had barely been begun.

QUANTITY AND QUALITY

In 1941 the industry went to work in real earnest, and produced the tremendous total of $775,000,000 worth of new machine tools. In 1942 they reached what would have seemed an impossible total only a few years before by producing machine tools to the value of $1,300,000,000.

This was not merely an increase in quantity. This tremendous increase in output had to be secured while improving the standard of accuracy of machines and without sacrificing in quality or in material, for the accuracies to which modern weapons must be built have tested to the utmost the ability of the machine tool builder.

A recent release by the War Production Board and widely commented on in newspapers, has given rise to some misunderstanding and has created the impression in certain quarters that we have now produced all of the machine tools necessary in order to beat the Axis. I wish that were true, but the situation is not so simple, nor are we yet at the end of our task.

In July, 1941, a committee of the National Machine Tool Builders' Association undertook on its own responsibility, a survey of the ten most urgent war contracts then being equipped.

Their object was to learn whether the proper machines had been ordered, whether too many machines had been ordered and whether the delivery dates specified were earlier than the dates on which the machine tools could actually be put to work.

SCREENING PROCEDURE

Results of the survey were reported to the War Production Board and a supplementary survey was later undertaken of the next most important forty contracts. Out of this initial survey arose the procedure of "screening" machine tool orders which has been in use since that time.

The needs of a contractor are screened by his contracting officer, by the service for which he is working, and in many cases have also been screened by the Tools Division of the War Production Board. Latterly the function has been moved to the regional War Production Offices who now have the task of screening orders that amount to $100,000 or less.

The announcement by the WPB was intended to make clear that because of the growing volume of facilities already available, increasing care would be taken in this screening process, and that a new organization has been set up in Washington to pass on facilities projects as distinguished from individual demand for new machine tools.

WHAT IS CAPACITY?

The machine tool industry has always taken the position that orders should be placed with care, and that no machine tools should be built that are not directly and urgently needed for the war effort. It is obvious that to follow any other course would not only lead to confusion and the waste of precious material and man hours, but would mean that machine tools might go where they are not gravely needed at the cost of the contractor whose need is extremely urgent.

As the peak demand for machine tools is now past, it is reasonable that the WPB should exercise even greater care in this matter, but the procedure is in line with earlier policies and does not represent a radical departure.

It has been suggested that since already we have more machine tools in the United States than are necessary to cut up all of the materials we have available that certainly no more machine tools will be needed. Unfortunately the situation is not so simple.

We must have in every department of the armed services, sufficient capacity to meet the demand for that weapon. Thus we must have sufficient capacity to make all of the tanks that may be needed even though at the moment we are running the tank program at less than its full capacity. Similarly we must be in position to furnish plenty of shell, although at the moment the needs of battle are relatively low. It is not likely that we will at any time

(Concluded on page 118)

Specify SHEFFIELD ARMY-NAVY AERONAUTICAL TAPER PIPE THREAD GAGES

★ ★ ★

All styles of Taper Pipe Thread Gages included in Specification AN-GGG-P-363 for the inspection of aircraft fuel and oil line connections, are available from Sheffield.

Write for Bulletin #43-1 describing the use of one and three-step L_1 and L_3 plugs, 6-step plain plug, L_1 and L_2 thread rings, the 6-step plain ring—and other gages used in aircraft parts inspection.

L_1 Taper pipe thread plug Nitrigage single-step, Style 4000.
L_2 Pipe-thread ring Nitrigage, Style 4003.
L_3 Taper pipe thread plug Nitrigage 3-step, Style 4002.
L_3 Taper pipe thread plug Nitrigage 3-step, Style 4005.
L_1 Taper pipe thread ring Nitrigage basic, Style 4001.
L_3 Taper pipe thread plug Nitrigage single-step, Style 4004.
Plain taper ring Nitrigage 6-step, Style 4007.
Plain taper plug Nitrigage 6-step, Style 4006.
NWT
NW
NPT
ST
MX

SHEFFIELD
MASTER GAGEMAKERS

THE SHEFFIELD CORPORATION

Dayton, Ohio, U.S.A.

(Concluded from page 116)

be running all of our plants for the manufacture of war materiel at 100% capacity, and there will always be some idle capacity here and there.

It would be dangerous indeed to shift machines out of tank plants and out of shell plants into airplane plants because at the moment we want to expand our airplane production program. We might find ourselves facing a new situation for which we do not have an adequate remedy, and which requires a tremendous increase in the output of tanks and shell.

It follows that even though most of the war materiel programs are now adequately equipped, there will be a lingering or residual demand for machine tools of substantial size.

In the first place, there will be the demand from England and Russia who still want many millions of dollars worth of American machine tools with which to continue War production. There will also be the occasional need of replacing an old machine tool, hastily adapted to war use a year or two ago and which is now giving trouble and should be replaced. There will also be changes in design of war materiel as the experience of battle indicates the necessity for such changes, and there will be new weapons from time to time. For all of these new production facilities must be set up.

The present backlog of unfilled orders amounting to $600,000,000 which the industry still has on hand consists for the most part of machine tools urgently needed. All of these orders were screened before they were placed, and it is obvious that the first responsibility of the machine tool builder is to produce these machine tools. Nothing must interfere with his doing so.

The industry is criticized because it has not taken steps toward conversion to the manufacture of war materiel. The plain fact of the matter is that many machine tool builders have already undertaken the manufacture of war materiel, and that many more are giving the matter serious consideration.

CHANGING OUTPUT

The important objective has been, however, not to take on the manufacture of war materiel if in so doing we may interfere with the ability of the industry to meet promptly any unexpected demand for machine tools. War materiel can be made elsewhere but machine tools can be secured only from machine tool builders.

The change from machine tools to war materiel will proceed at a different pace in every shop, depending on how much of a backlog of unfilled orders that shop has, and how much future demand develops for that type of machine. But in any case, there is no reason for uneasiness on the part of the mechanics that have done such a magnificent job in the machine tool plant.

As rapidly as they finish their work on machine tools and to the extent that there is no longer a demand for machine tools, they present the armed services and their contractors, ideal sources of sub-contracting ability and capacity. They have the know how, the engineering and shop skill to work in metals to close limits of accuracy, and virtually all of the equipment needed already is in place.

Engineers are practical men and so are machine tool builders. They have to be. Any notions they get sooner or later have to pass the acid test of "Will it work?" At the same time they are constantly working with their eyes on the future. No machine tool builder ever comes to his desk in the morning thinking only of the day that lies immediately before him. His work is done with the need of that week, that month, and the future of his business constantly in the background of his mind.

Imagination is one of his most important tools. No line was ever put on drawing paper until someone had imagined what the finished product would look like and what it would do.

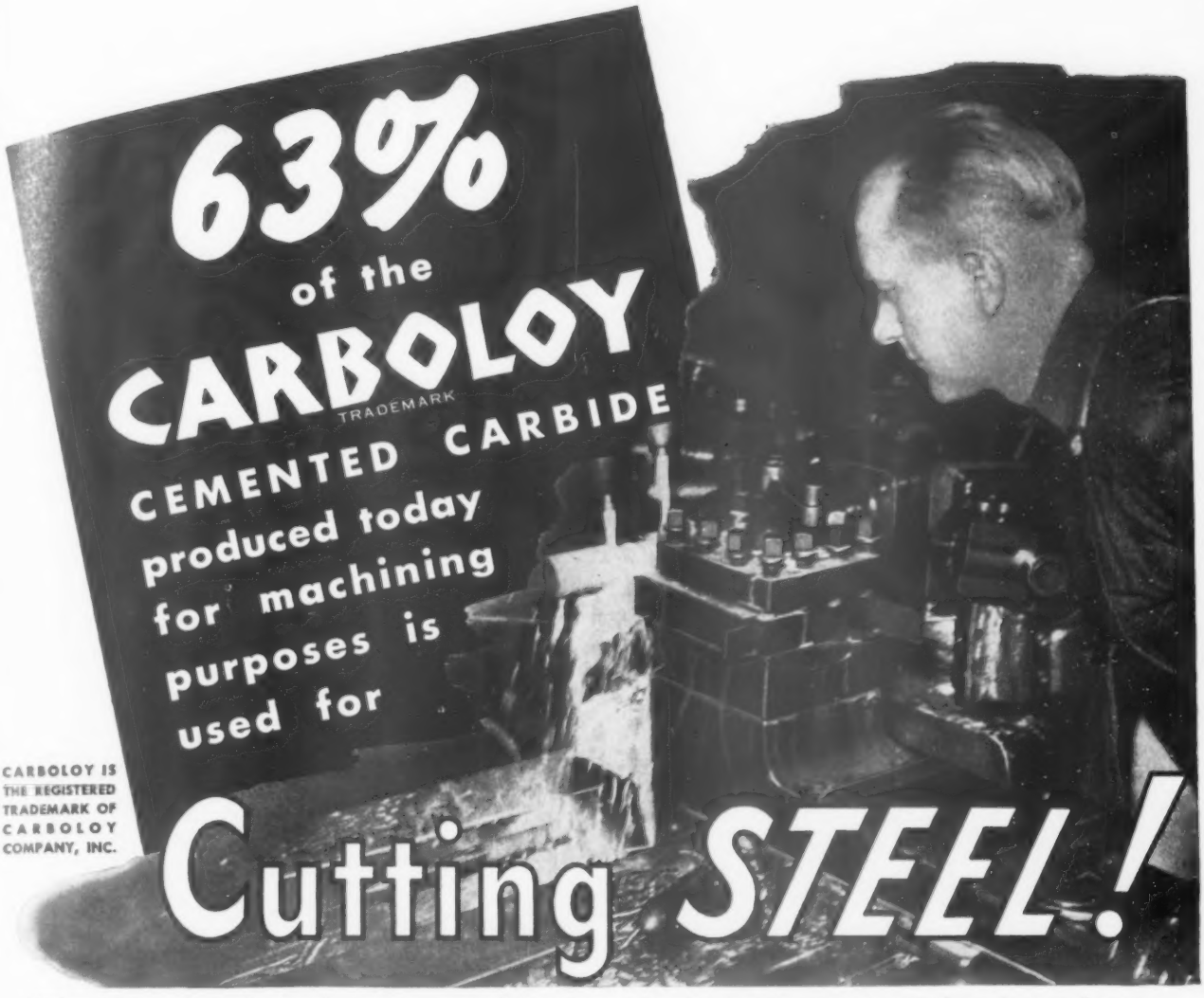
POST-WAR PRODUCTS

Playing their magnificent part in the winning of this war, the machine tool builders, too, have been looking ahead. They are looking ahead now to the difficult period that will follow the war when the world will have an enormous supply of fine, accurate machine tools slightly used, practically all of which will be adapted to the manufacture of peace time needs.

There need be no doubt the way machine tool builders will meet this situation. They will redesign their machines. They will improve them, they will use materials that have been developed during the war. And their new products will be so much more convenient, so much more flexible and so much more accurate that American industry will not be able to resist buying them.

THE END

FOR FINER
FASTER FINISHING
Use DREMEL MOTO-TOOLS
Model 2 Moto-Tool, complete with accessories, as illustrated, in felt-lined hardwood case—$23.50. Model 2 Moto-Tool only, with emery wheel point — $16.50.
27,000 R.P.M.
Used in machine shops and tool rooms for finishing intricate dies. Used on production lines to clean castings, turnings and forgings . . . sharpen tools and do hundreds of grinding, finishing, polishing, burring, routing and etching operations.
Dremel Moto-Tool has AC-DC motor with shockproof bakelite housing, oil-sealed (oil-less) bearings, and built-in cooling fan. Weighs only 13 ounces—so light and compact a girl can handle it with ease. Dynamically balanced armature eliminates vibration and provides precision control. Moto-Tool's high speed (27,000 rpm) permits finer, faster work — conserves cutters.
Dremel Moto-Tools are proving indispensable aids in speeding up war production in such plants as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Douglas and Northrup Aircraft, and many similar "Arsenals of Democracy."
10 DAY TRIAL
Try a Dremel Moto-Tool on your own jobs—in your own shop. See how versatile, how indispensable it is—how it saves time and materials. Order from your distributor. If he cannot supply you — write factory. PROMPT SHIPMENT on orders with proper priority.
Whether you have a Moto-Tool or any other type of grinder, use only genuine Dremel shop-tested Accessories—steel cutters, emery wheel points, brushes, sanders, etc. Write for literature.
DREMEL MFG. CO. Dept. 443-G RACINE, WIS. U.S.A.



CARBOLOY IS THE REGISTERED TRADEMARK OF CARBOLOY COMPANY, INC.

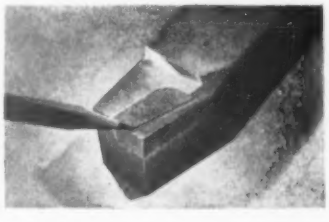
"Ploughing" through tough cast armor plate at cuts up to 1 in. deep—drilling gun barrels—cutting off shell—taking interrupted cuts through sand holes and scale—producing a quality of finish on critical parts often impossible to obtain with former tools—holding close tolerances that drastically reduce and often entirely eliminate subsequent grinding—making steels of 400 to 500 Brinell machineable—these are typical of the present day uses of Carboloy cemented carbide tools for cutting steel.

Today 63% of all Carboloy cemented carbides produced by Carboloy Company for machining applications are steel cutting grades. You'll find them in practically every major war plant throughout the nation, turning out steel parts for war at speeds 4 to 5 times faster than former tool materials, staying sharp up to 10 times longer—increasing production often as much as 300% on the thousands of applications upon which victory depends.

Write today for catalog GT-142 listing Carboloy cemented carbide grades for cutting steel, cast iron and non-ferrous metals available in more than 300 standard Carboloy tools and blanks.

Are You Using The Right Chip Breaker?

A special film available on design and grinding of chip breakers for carbide tools. One of a series of six films on Design, Brazing, Application and Grinding of carbide tools for use in your training program. Write for folder GT-151.



CARBOLOY COMPANY, INC., 11145 E. 8 MILE ROAD, DETROIT, MICHIGAN

Sole makers of the Carboloy brand of cemented carbides

Birmingham, Ala. • Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Seattle

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto, Canada. *Foreign Distributor:* International General Electric Co., Schenectady, N. Y.

CARBOLOY TRADEMARK

TITANIUM CARBIDES
TANTALUM CARBIDES
TUNGSTEN CARBIDES

WHEN THE BIG FELLOWS ARE ON THE LEVEL...

They'll Cut Straight

The principal reason why large milling machines do not cut straight is because of inadequate foundations and lack of attention to periodic and accurate releveling. True enough, once the machine is installed, the operator or department supervisor can do little about the foundation, but they *can relevel the machine periodically*. And it's so easy to do. The little fellow at the right, in the first two illustrations, shows you how it's done on CINCINNATI Hydromatic Milling Machines.

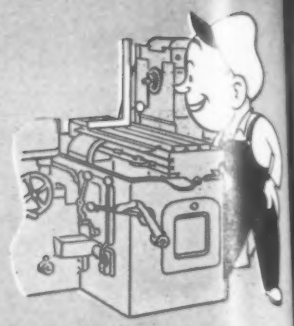
There are other factors, too, in keeping your Hydromatic running continuously while turning out a high volume of accurate work.

1. *Level the machine periodically.* Once every six months should do the job. Leveling blocks should be used for all but the smallest machines.
2. *Follow lubricating instructions.* A lubricating schedule tag tied to the machine serves as a convenient reminder.
3. *Use clean containers for the oil,* especially oil for the hydraulic unit.
4. *Clean the hydraulic oil filter.* Once or twice a month should be sufficient.
5. *Keep the guard in place over the feed trip plunger.* This will help prevent accidents; will keep grit and coolant out of feed trip mechanism.
6. *Loosen quill clamping nut* before making quill adjustments.

The above routine is just as easy to follow as it looks. Try it—give the machine a chance to make a production record equal to your attendance record.

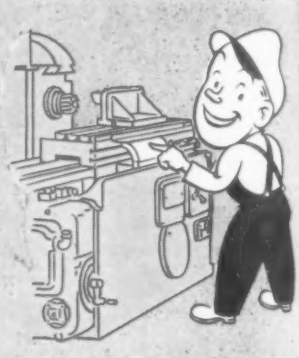
CINCINNATI

Below: Milling two sides of Diesel engine connecting rods on a CINCINNATI Duplex Hydromatic. Complete description and engineering specifications of the Hydromatic line may be obtained by writing for catalog No. M-955-1.

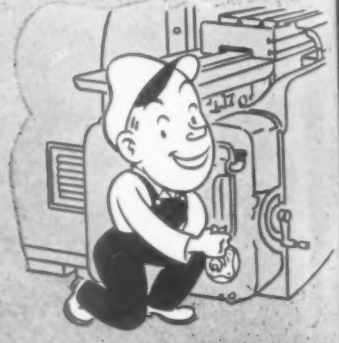


Check the headstock level accuracy by "tramming" with indicator gage fastened to spindle nose.

Level the machine periodically. It's easier to do and longer lasting when machine is mounted on leveling blocks.



With the guard in place, there's no chance for the operator to get his fingers caught between the table dogs and trip plunger



With a small wrench, the hydraulic oil filter may be cleaned in a few seconds. Do this at least once a month.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI OHIO U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES · SURFACE BROACHING MACHINES · CUTTER SHARPENING MACHINES

INDUSTRIAL *NEWS* DIGEST

. . . a review of significant developments and new techniques in mass production industries . . .

Air conditioning units supplied for war plants.

The Government's appeal for heavy air-conditioning units needed for temperature control in essential war plants has brought responses from more than fifty firms. Already, twenty-two such units, representing a total capacity of about 38,000 horsepower, have been moved to plants producing high octane gasoline, synthetic rubber and airplane engines, the W. P. Board has reported.

Sources: The units were offered by department stores, office buildings and hotels. Some gave more than one unit.

Typical use is in an airplane plant requiring about 9,000 tons of refrigerating capacity which will go into operation this month with 68 per cent of volunteered air-conditioning equipment and 32 per cent new equipment. Units made by five different manufacturing companies are included in the installation. The program was launched late last year to save the critical material and man-hours which would have been required to manufacture new equipment.

Metals sufficient to win war A.S.M. Regional meeting told.

"We are going to have enough metal to win the war," Dr. Zay Jeffries, leading Metallurgist, told 400 members of his profession attending a Regional Meeting of the American Society for Metals.

Technical director of General Electric lamp department at Nela Park, Cleveland, Ohio, and chairman of the Advisory Division of the War Metallurgy Committee, National Research Council, Dr. Jeffries spoke at New Haven, Connecticut. We now have available all types of metal, except tin, in substantially greater quantities than we did before the war, he said.

Tool Steels: An earlier speaker on the program, Samuel C. Spalding, metallurgical engineer of the American Brass Co., Waterbury, and a member of the W.P.B. declared that the serious shortage of alloys for tool steels at the start of the war has been considerably relieved. "There was a time," Spalding revealed, "when the tool steel industry existed from hand to mouth never knowing where the next supply of critical alloys, used in producing fine tool steels, was to be found." He revealed that the lack of vanadium was so great a year and a half ago that the smokestack of every coal burning steamship which entered our ports was cleaned for what little vanadium that could be derived from the soot.

A new post war mass production industry was envisioned by Igar Sikorsky, who has produced a helicopter accepted by the U. S. Army. He predicted that "within a decade after the war, there will be hundreds of thousands, possibly a million, helicopters in actual use in this country." He foresees the helicopter as a vital factor in the period of demobilization of the aircraft industry after the war, permitting the utilization of facilities and the employment of a gradually increasing part of the war-trained personnel which will become available.

Metal Trades Association honors production engineers.

The National Metal Trades Association has nominated three engineer-scientists for awards of merit for their "outstanding contributions to the war effort" in the metal trades industry.

Work: The awards, to be made at the association's 45th annual convention and production conference, will go to: Oliver W. Bonnafe of Lapointe Machine Tool Company, whose work in developing broach rifling machines helped bring about the rifling of 50-caliber machine gun barrels at a rate of 50 times faster than with previously used methods; John C. Dobyne, of the Champion Slot Machine Company, who perfected a machine for banding 20 mm. projectiles with copper bands, increasing production eight times; and

(Continued on following page)

Training for Industry

Caterpillar instructor familiarizes war emergency plan apprentices with the use of snap gages on Diesel crankshafts.

Caterpillar Tractor Company has instituted a war emergency training plan under which apprentice graduates may secure high school and company diplomas of graduation upon completion of four-year machinist, pattern-maker or foundry-man courses.

Sixteen-year-old boys with two years of high school may enroll. Both shop and classroom instruction are given. Emergency apprentices who enter military service after enrolling may return to complete their courses. After the war Caterpillar will require new apprentices to have high school diplomas.

"GREENIE" T.M. REG. U.S. PAT. OFF. — *A slight misunderstanding*

GREENIE! WHAT ON EARTH HAVE YOU DONE TO THE SUPERINTENDENT ?
WHY, BOSS! DON'T YOU REMEMBER? — YOU SENT ME UP HERE TO POLISH OFF ONE OF THE BIG GUNS!

of Meehanite Metal, cast to desired shape

NOW you can get your own special shapes as well as the usual standard sizes in Victory Tool Shanks. Just send us a sketch of the shank, showing shape and size, for a quotation. The cost of even the most unusual, difficult shapes is surprisingly low.

Chief advantages of Victory Tool Shanks of tough Meehanite, cast to any desired shape, are these:

1. They eliminate the need for critical steels.
2. They are immediately available in quantity.
3. They require a minimum of machining before use.
4. Carbide cutting tips are easily affixed in any shop equipped to tip its tools.
5. Meehanite does not load the grinding wheel as rapidly as steel.
6. Meehanite has double the vibration damping capacity of steel.
7. Meehanite has a coefficient of expansion closer to carbide than has steel.

WHEN YOU WRITE, ask for Bulletin No. 53 T-2 which shows standard sizes and prices. Pick out a size you can use and ask for free samples. We invite you to judge Victory Tool Shanks by their performance in your own shop.

THE COOPER-BESSEMER CORPORATION
Dept. E, Mount Vernon, Ohio

Cooper-Bessemer

(Continued from preceding page)

E. Lovell Smith, of the Package Machinery Company, whose development of an automatic clip loader for small arms ammunition increased by 14 times the speed of loading clips for Garand rifles.

Business Notes: Purchases, expansions and new services

Kaiser's future: Miracle Worker Henry J. Kaiser is now building ships, turning out dive-bombers and fighters, producing steel, digging coal and making magnesium.

Always looking ahead he has promised to get really busy after the war, produce helicopters, lightweight automobiles and prefabricated houses. Last month he called in newsmen, and announced another post-war project: lightweight passenger and freight cars. Said Kaiser, "We agree that our railroads must be rebuilt after the war, that millions of shipyard workers must have jobs. This will do both."

Eastern industry is watching Kaiser, admits he is a mass producer. Unfortunate reaction is the auto industry's: Mouthing reasons why he won't be able to beat the price differential in Eastern competition if he builds his car in the West.

* *

Research: The ever progressive Dow Chemical Company, synthetic and light metal producer, has organized a new division for development of new chemical products for use now and after the war and to extend the wartime usage of present products and facilities.

Dow officials say the division will grow as large as industry requires. Its headquarters in Midland, Michigan, will be staffed by experts with technical knowledge of Dow products and specific industries. Dow men will take the initiative, will offer ideas to technical men in other industries. Problems resulting will be worked out in the Midland laboratories.

* *

Purchase: The Evans Flexible Reamer Company of Chicago, by Lempco Products, Incorporated, Bedford, Ohio. The Evans name will be retained in the new corporate title, Evans Reamer & Machine Company. No change in personnel is contemplated.

The Evans, it is claimed, is the only Opposite Spiral, High Speed, Steel Expansion Reamer sold commercially. All Lempco-Evans Spiral Blades will continue to be sharpened at Chicago.

* *

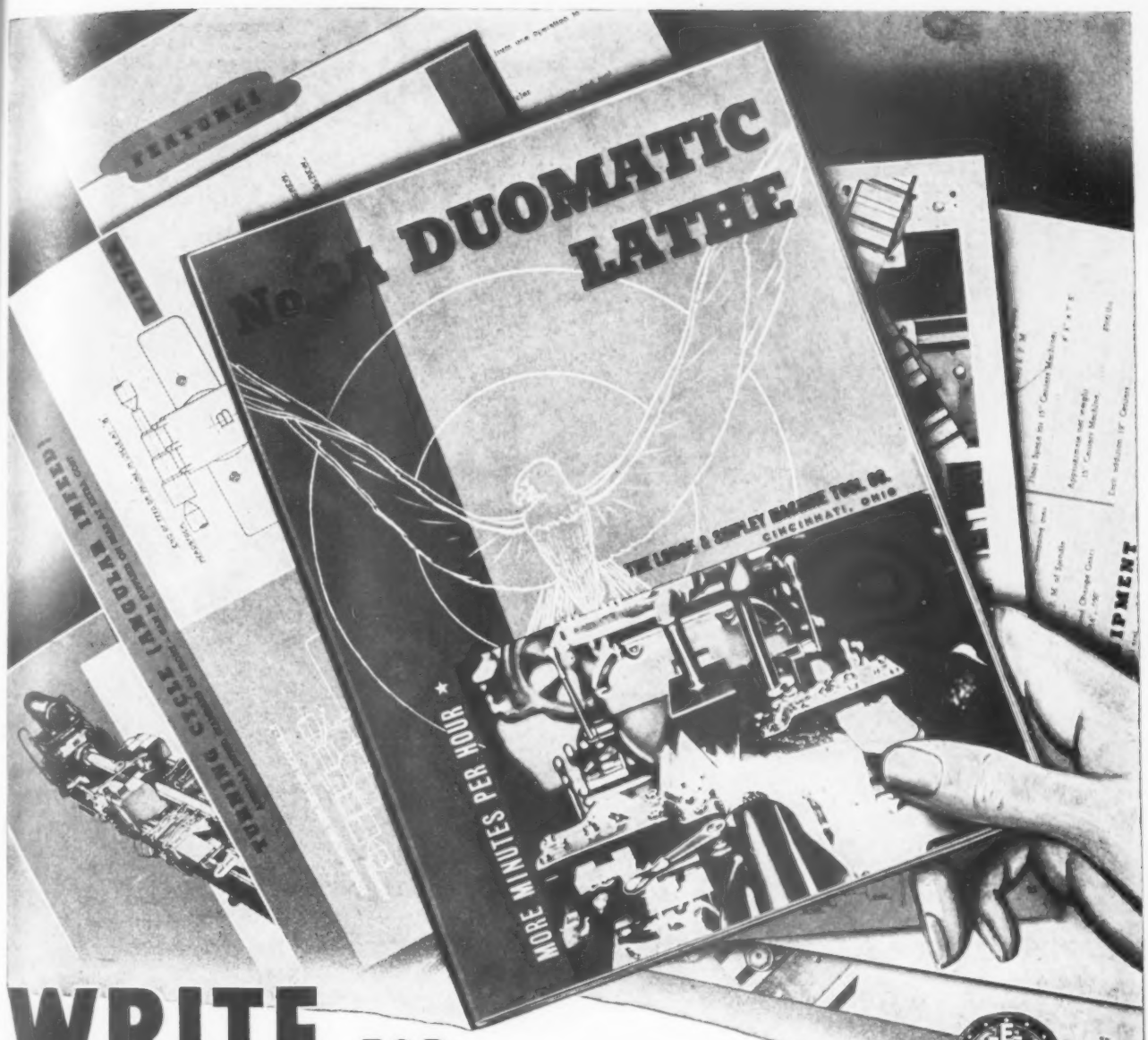
Laboratory: The Ilg Electric Ventilating Company, Chicago, is erecting a new research laboratory. The company mentions post war planning in announcing its expanded research activities. Equipment will include instruments for measuring air, electricity, sound, light and vibration. Stroboscopic equipment will be supplied for checking deflection while equipment is in operation.

* *

Kearney & Trecker: Five executives elected to new offices of the concern. J. L. Trecker was named executive vice president; R. W. Burk, vice president in charge of sales; E. W. Trecker, vice president in charge of manufacturing; J. B. Armitage, vice president in charge of engineering and R. L. Bischoff, treasurer and assistant secretary.

* *

(Continued on page 124)



WRITE FOR the 26-page Book No. 601-FL covering:

1 . . . Outstanding Features.
2 . . . Operation Cycles and Diagrams.
3 . . . Specifications.
4 . . . Representative Tooling Applications of the No. 3A Duomatic (automatic) Lathe.

Since March 6, 1942

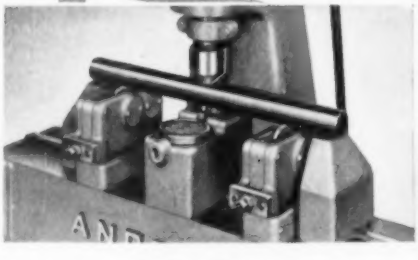
THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, OHIO, U.S.A.

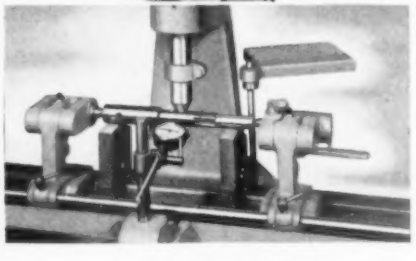
ENGINE TOOL ROOM AUTOMATIC LATHES

HYDRAULIC HAND PRESS

For High Speed CHECKING AND STRAIGHTENING



EQUIPPED WITH DISCS



EQUIPPED WITH CENTERS

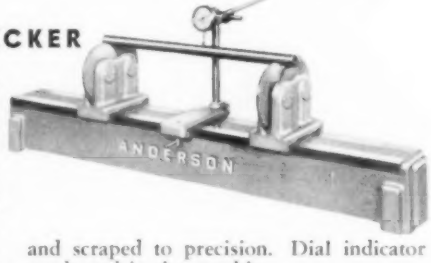
Checks and Bends in Same Position...

Eliminates Moving Shaft from Anvil to Centers for Checking

When pressure is released the spring tension on rolls brings the shaft free of the anvils and free to rotate for checking. Checking rolls are easily adjusted for various shaft lengths and can be removed altogether if necessary. Press is equipped with an indicator gauge calibrated in thousandths of an inch for locating high and low spots on shaft. Also a pressure gauge calibrated in pounds. The exact tonnage required to straighten any shaft can be quickly determined by the operator. This time-saving unit is operated by a hand hydraulic pump with a capacity up to 20,000 pounds.

The Anderson Hydrualic Hand Press is a high production machine that will pay good dividends in any plant where a quantity of shaft straightening operations are performed. Send prints or sample parts for our recommendations regarding size of machine best adapted to your particular needs.

High Speed ROTO CHECKER



Designed for speed and accuracy in checking straight shafting, tubing, and pieces having the same diameter at both ends. The work is mounted directly on discs which rotate on supersensitive ball bearings. Time customarily used for cleaning and conditioning centers is eliminated, also the time for mounting between centers. Balancing can also be handled by this machine. Base is of sturdy design, well ribbed and scraped to precision. Dial indicator graduated in thousandths.

Write for Details to ANDERSON BROS. MFG. CO., ROCKFORD, ILL.

Anderson SHOP TOOLS

(Continued from page 122)

New house organ: A. W. Heckler, Cleveland designer and builder of tools and fixtures and fabricator of aircraft parts, has published the first issue of a new house organ. Title of the illustrated and attractive monthly is "The Heckler Micronicle".

* *

Expansion: The Grobet File Company of America, importers of precision Swiss files and manufacturers of Ro-

Tool Loans Speed Production

General Electric Pittsfield Works Maintenance Department worker sorts reclaimed drills for the company's reclamation program.

When new production created an unexpected demand for drills, taps, reamers, saws and miscellaneous tools at G. E.'s Pittsfield Works recently, workmen loaned the company 992 small tools.

The personal tool chest collection was in response to a plea by maintenance department foremen, who promised that tools turned in would be replaced by the company as new tools were obtained. Typical tools contributed: Straight and taper shank drills, taps and reamers, with a total value of $1,198. Meanwhile through a salvage and reclamation program, 1,700 pounds of high-speed steel tools were recut at a cost of $2,500 into new tools with a value of approximately $4,500. Tools which could not be reclaimed were sold to toolmakers after being spark-tested and classified.

tary files have doubled the factory area of their New York City plant. The added floor space is designed to facilitate greater output of files and ground cutters.

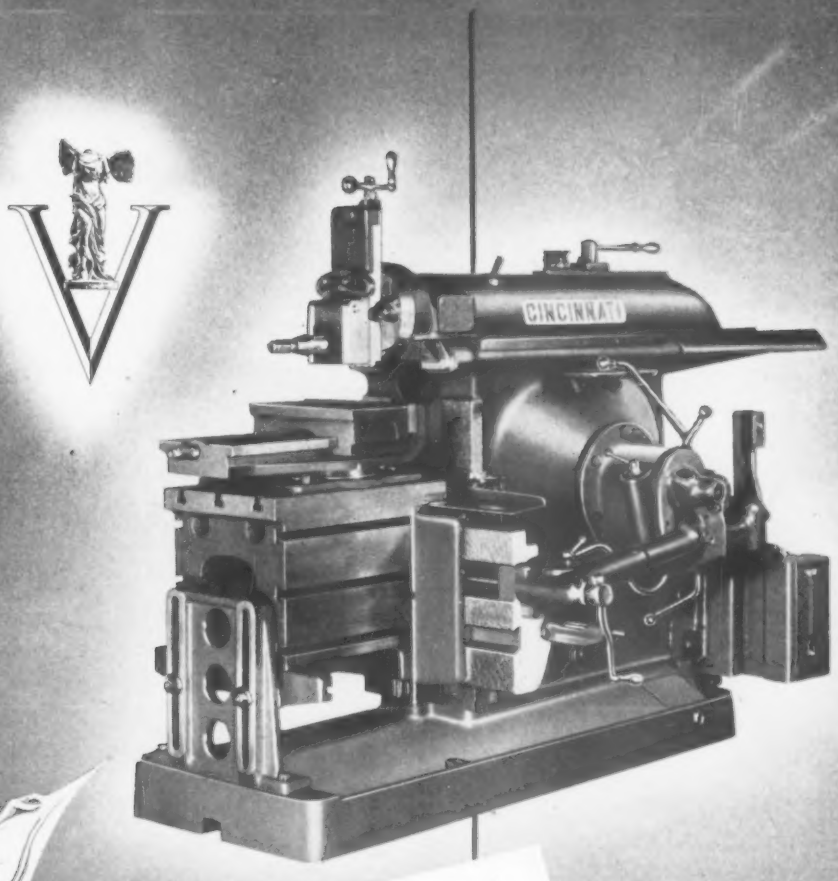
* *

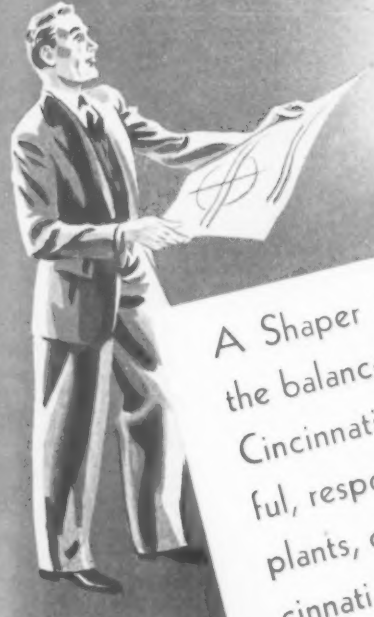
New Concern: John D. Gordon, formerly of the Taylor-Winfield Corporation, has announced the formation of Detroit Electronic Laboratory, Detroit. Company plans involve the development and manufacture of special purpose electronic tubes, including a line for control equipment for resistance welding. Tubes which Detroit Electronic is prepared to repair as a wartime service include General Electric GL and GF series and Westinghouse WL series, ranging from 150 to 1,200 KVA.

* *

(Continued on page 127)

Check Your CENTER of GRAVITY!





A Shaper is the center of gravity of the balanced tool room and die shop. Cincinnati Shapers are accurate, powerful, responsive. In batteries in the large plants, or singly in the small shop, Cincinnati Shapers give outstanding value

Write for Catalog N-2

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

DALZEN *Broaches*

ROUND AND FLAT . . . IN A COMPLETE SIZE RANGE

For maximum parts per grind plus maximum grinds per broach specify Dalzen broaches.

Dalzen broaches are ground from your blueprints by precision craftsmen with years of experience in broach making. Flat broaches are available in any size; round broaches, in any size up to 72".

When ordering, give make and number of machine, length of stroke and type of holder.

A DALZEN WILL DO IT! Dalzen tools — taps, flat and round broaches, thread milling hobs — have the same high reputation for accuracy and dependability as Dalzen Thread Grinders and Center Lapping Machines. Sturdy, compact, efficient, Dalzen machine tools give maximum production per cubic foot, per pound, per dollar of cost! Write for descriptive literature.

DALZEN

TOOL & MANUFACTURING CO.

12255 EAST 8 MILE ROAD • DETROIT

DALZEN IN AIRCRAFT

Ground thread parts are being produced on equipment for leading aircraft engine manufacturers. For detailed data on this service, submit blueprints and specifications when making inquiry.

TE1

(Continued from page 124)

Westinghouse: Completion of a new four-acre blackout Defense Plant Corporation factory on the East Coast to produce radio equipment for the Army has been announced by the company's Radio Division. The plant will augment Westinghouse output of communications equipment, increased more than 40 times since the Defense Program was launched.

The plant is in two sections, one for assembly of parts, the other for machining and fabricating. An innovation is the handling of interior traffic, which flows next to the side walls, leaving remaining areas clear. Nearly two miles of tubular fluorescent lamps simulate daylight working conditions. Air is changed every 15 minutes. In addition, 12 other Divisions and more than 100 subcontractors are aiding the company's production of radio equipment.

A.S.T.E. speakers featured at Mechanical Engineers' conclave

"The nation's production goal can only be met this year if we employ 6,000,000 women in our industries," Walter F. Wagner, Willow Run Bomber Plant official said last month in addressing the American Society of Mechanical Engineers' semi-annual meeting in Los Angeles.

Wagner, who is Past President of the American Society of Tool Engineers, spoke at the West Coast Production conference through an invitation extended to the A.S.T.E. to cooperate in presenting several technical sessions. Wagner told the Mechanical Engineers that an increasing reliance is being placed on women employed in the expansive Ford aircraft project in Michigan. "They are even invading the sacred portals of the engineering and research departments," he said.

The Ford executive substituted for W. A. Simonds, of the Bomber Plant personnel and public relations staff, who was scheduled to repeat the address he delivered at the Tool Engineers' National Meeting in Milwaukee last March.

Other A.S.T.E. speakers: At the meeting, held to seek solutions to specific war production problems, two other speakers at the last annual conclave of the A.S.T.E. offered suggestions on "women in industry" and "aviation production engineering". In both fields, wartime manpower problems and the design of perishable tools, the A.S.T.E. has displayed leadership.

The two other A.S.T.E. speakers were J. I. Onarheim, who told how Allis-Chalmers Manufacturing Co. selects and trains women workers; and A. A. Schwartz, Bell Aircraft Corp., who described tools and methods for high-speed machining of aircraft parts. Articles by Mr. Schwartz on these subjects appeared in the April and May 1943 issues of The Tool Engineer.

Arthur Dennis, Chairman of the Los Angeles Chapter A.S.T.E., presided at this technical session.

Aircraft goal depends on scheduling; Willow Run over the hump.

Production in aircraft parts manufacture increasingly will be under the scrutiny of the "scheduling experts" of WPB. Production Boss Charles E. Wilson last month announced that achievement of the 1943 aircraft goal could be realized only if the most exacting control of output of component parts is maintained.

Shortages: Said WPB's Wilson, "There are at present no serious bottlenecks in the assembly of such fundamental plane parts as propellers, engines, or air-frames. Temporary but serious minor bottlenecks, however, in smaller and less obvious categories, such as forgings and extrusions, have not yet been entirely overcome. The specific shortages differ from month to month but will continue to arise until production and distribution of all plane parts and pieces are exactly balanced with requirements."

* *

Bitter fruit: Many a man on the street in the Motor Capital can tell you more about the battle of production than New York and Washington news editors. And news on the street in Detroit last week about Willow Run was good and it was true. It was bitter news for the Axis.

Much maligned, automobile manufacturing methods in the manufacture of B-24 bombers are now paying off at Henry Ford's industrial gargantua. Everybody knows that the plant was designed to produce one four-engine plane every two hours. One optimistic production boss boasted that the plant could hit a rate of one ship every hour and 40 minutes. A lot of Detroiters are wondering if an announcement on June and July Willow Run production wouldn't be excellent propaganda, wouldn't lift the stigma of early Willow Run criticism.

Figures on the center wing section — 55 feet long — reveal that in the last eight months production has increased 700 per cent. The decrease in man hours required to build this section has amounted to 92.6 per cent. The decrease in cycle time, or actual construction time, is 94 per cent.

Actual figures on the Ford-method of interchangeability in skin and stringer assembly show a 300 per cent increase in production and 62 per cent decrease in man hours.

Tooling: Two recent developments in center wing section sub-assemblies further illustrate how the production rate is being increased and tremendous man hour and time savings are being achieved. An automatic spar riveter, a new Ford development, is riveting 1,300 rivets in 37 minutes with three operations, replacing an operation which occupied the time of five work-

(Continued on page 128)

INGENIOUS TOOLING

• Outstanding ingenuity in tooling was displayed by Chevrolet production experts who converted this machine to do a creditable war job. Faced with a demand for increased output at a time when new machine tools were nearly unobtainable, auto engineers converted an idle Natco horizontal drill into a special transfer case drilling machine. By using two standard automobile transfer cases for drill heads and connecting them to the fixture by eight Chevrolet passenger car universal joints, a tool was created that increased the plant's transfer case output almost 60 per cent. The unit was completed in two months against the six to eight months required for delivery of the special tools needed to do the job: tool costs were cut substantially and scheduled delivery dates for the Army truck transfer cases produced were met.

Battle Strategy on DRAWING BOARDS
A McKinney built, four position, indexing jig for high production drilling of important airplane parts, to close tolerances.

LIKE the battle front, the production front also requires competent strategy.

McKinney engineers (production strategists if you please) have *designed* the tool equipment for producing essential parts of many planes, tanks, guns, etc.

And the McKinney organization, with plant and facilities for working up to 500 tool technicians, has *built* the tools for producing many machines and implements of war—all requiring split-thousandth accuracy.

McKinney tooling experience—dating since 1920—and their substantial contributions to our war program give assurance of handling your most important tooling jobs—satisfactorily and promptly.

Send us your blueprints or request the call of a McKinney engineer

McKINNEY TOOL & MFG. CO.
CLEVELAND
DESIGN and PRODUCTION ENGINEERS
Since 1920
1671 ARABELLA AVE.
Tools·Dies·Jigs·Fixtures·Special Machinery

(Continued from page 127)

ers and consumed 2.5 hours.

Indicative of the time saving achieved in this one sub-assembly department alone, the man hour time for a completed spar has been reduced from 11h to 24 man hours, in the space of eight months. An ingenious multiple head drill now drills 716 holes in a skin splice automatically in eight minutes with one man operating it. This replaces a former manual operation which took two operators 45 minutes.

Somebody said Willow Run would never hit its stride.

* *

Bell Aircraft: The builders of the famed P-39 Airacobra have revealed that they have developed and are producing in quantity an aircraft machine gun recoil damping device used on all types of bombing planes. The mechanism is a portable, light-weight cradle consisting of two steel tubes and a hydraulic absorption unit and is attached to a .50 calibre aircraft machine gun by two bolts. It adds less than an inch to the overall dimensions of the gun, and only three pounds to its weight. Bell engineers say its construction involves the type of work necessary to all ordnance equipment.

Materials: Swedish iron development; Iron and steel scrap

New method: From Sweden last month came news which startled the American iron and steel trade. A scientist there has perfected a method of using electricity to produce malleable iron direct from the ore without first making pig iron. The process was developed after 10 years of research by Professor Martin Wiberg, of the Royal College of Technology in Stockholm, at the Soderfors Iron Works. The method is shrouded in secrecy and no details have been revealed.

* *

Iron and steel scrap: Although copper scrap is Number One on the list of critical material shortages, iron and steel scrap inventories are diminishing rapidly. WPB hopes that the double emphasis on both copper and steel scrap will increase the flow of each.

Motor Manufacturing Memos: Aircraft output rises sharply

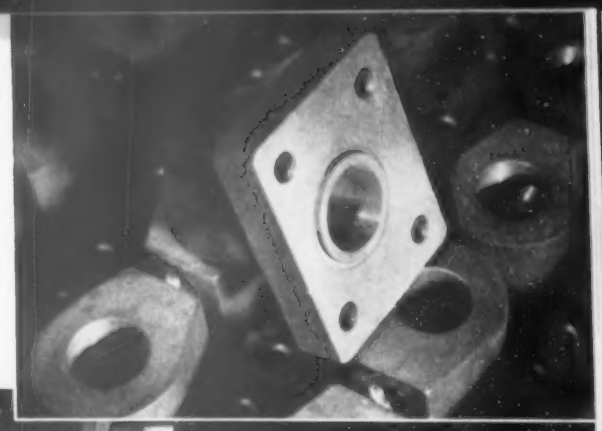
Aircraft up: Early in the defense and war production programs, the output of the automobile industry was largely ordnance and military vehicles. In the past 12 months, output of the industry has changed radically. Aircraft and aircraft parts now represent a large portion of their total production, and, before the close of the year, will amount to fully 50 per cent.

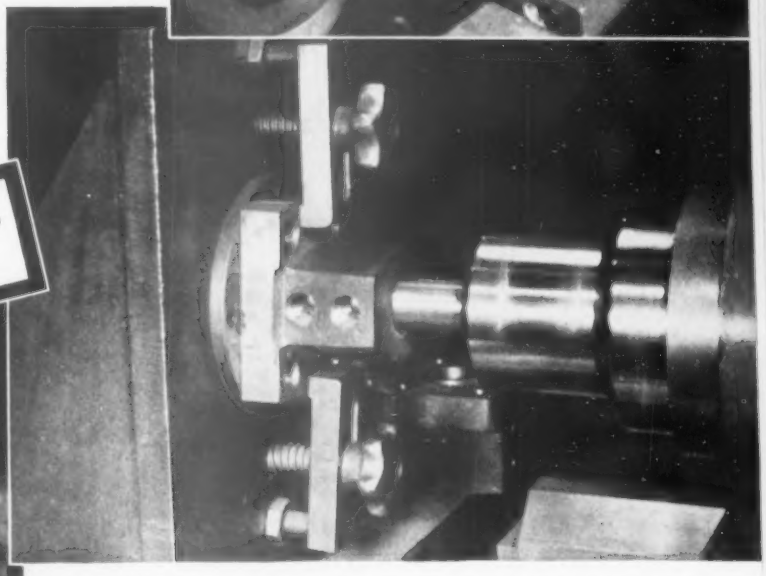
A year ago this month military vehicles were in the lead, representing 40 per cent of the automotive war products, against 30 per cent for aircraft and less than 10 per cent for tanks. Now, with the industry volume well past the million-dollar-an-hour mark and the production curve still rising, aircraft has moved into first place, commanding 33 per cent of the increased production, tanks second with 25 per cent. So fast did assembly lines spew forth wheeled-vehicles last year that cutbacks and increased total production has left only 20 per cent of the output in this category.

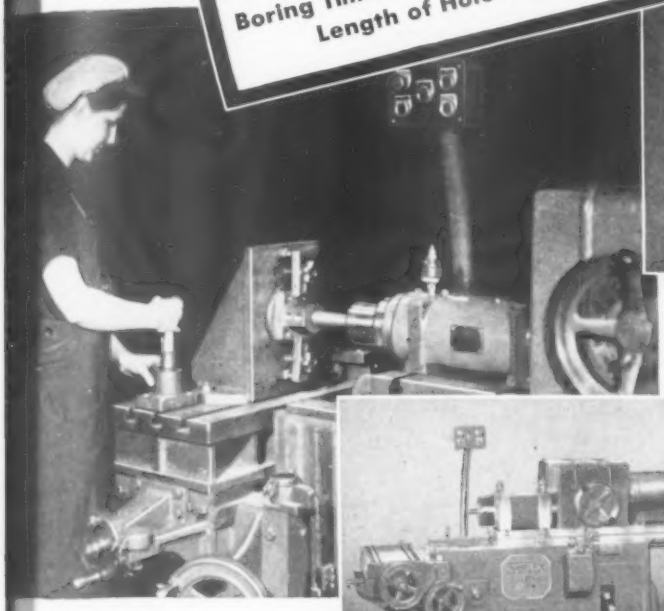
(Continued on page —)

Accuracy Held to $\frac{+.0005''}{-.0000''}$ in Finish Boring Flanged Tool Holders on *Knee-Type* STOKERUNIT SIMPLEX PRECISION BORING MACHINE

Boring Time 2¼ Minutes Per Hole
Length of Hole 3 1/32″

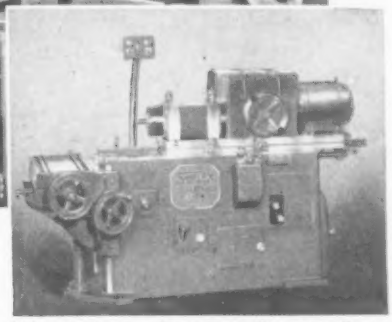






(Left) Automatic precision operation—girl worker maintains accuracy and finish in production.

(Above) Work piece is accurately held in simple fixture with hand clamps.



(Above) Simplex Knee-Type Precision Boring Machine with No. 4 Spindle, variable speed spindle drive and turret stop for table.

In precision boring the hole in this flanged tool holder for turret lathes, the Knee-Type Stokerunit Simplex Precision Boring Machine maintains extremely close tolerances in diameter and location. High finish is also assured.

Boring Data: Dia. of finish bore is 1.500″ (+1.5005″ −.0000″). Length of bore is 3 11/32″. Work piece accurately located in fixture on counter bore flange. Finish boring time is 2¼ minutes each. Spindle speed 850 r.p.m.; feed 1½″ per minute. Approximately 150 pieces are bored per sharpening of the tungsten carbide cutters.

Versatile *Universal* Performance

This manufacturer of machine tools is using the Knee-Type Stokerunit Simplex Precision Boring Machine for a wide variety of precision boring operations. For example, boring a number of holes in various locations on a multiple tool head is accomplished with maximum efficiency on this machine. Knee is adjustable vertically—table laterally. Built-in dial gauges, graduated in ten thousandths, with precision length bars, permit accurate table positioning. Rapid traverse of spindle unit provides quick approach to cutting position and return at end of machining cycle.

To Solve Your Precision Boring Problems . . . get the complete Stokerunit story today. Over 25 models of Simplex Precision Boring Machines cover practically the entire range of precision boring applications. They are available in mechanical and hydraulic feeds, with single or multiple spindles, for either short-run or production work.

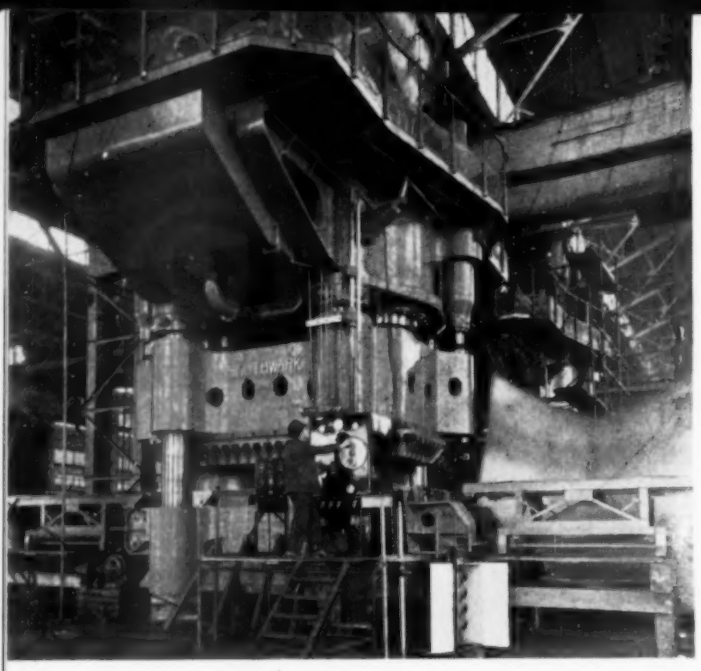
For specific recommendations, send blueprints of parts with production requirements. No obligation.

Write Today for these two booklets covering details of our entire line of Simplex Precision Boring Machines.

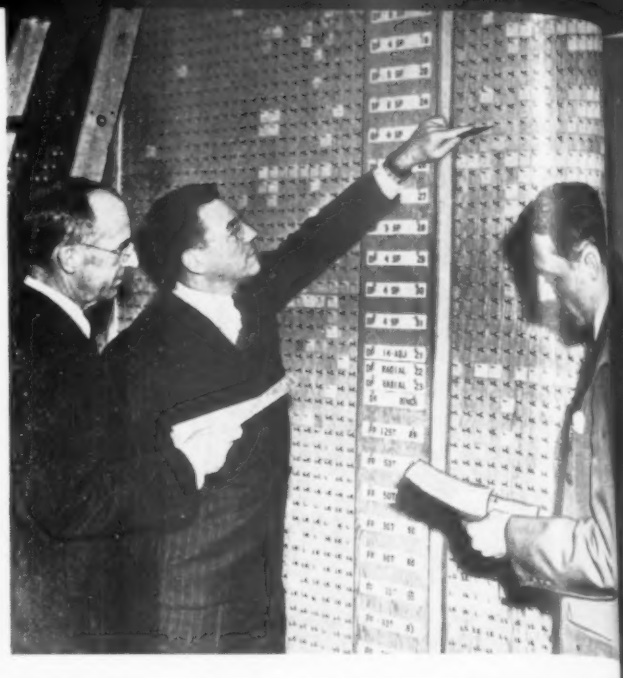
STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINE

4528 WEST MITCHELL STREET MILWAUKEE 14, WISCONSIN

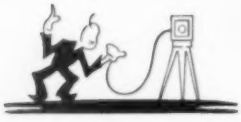


One of three massive 5,500-ton capacity completely automatic Southwark Hydraulic presses for forming duralumin aircraft parts. The press is 33 feet high and weighs approximately 960,000 pounds.



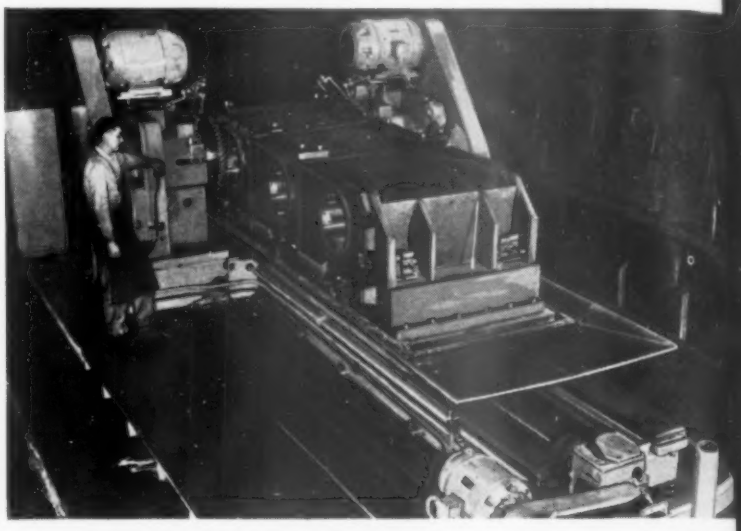
Officials of Brown Instrument Division of Minneapolis-Honeywell Regulator Company at production progress scheduling board which shows why they won WPB thanks for doubling output of flow meters.

PRODUCTION PIX



WHAT'S DOING IN THE WORLD OF MASS MANUFACTURING

Right—In Buick production of tank drive and transmission units three housings pass through a special milling machine which roughs and finishes end faces simultaneously. The miller has a 36-foot bed. Its fixture weighs seven tons.



California's Weber Showcase and Fixture Company men check Kohler electric plants from Wisconsin that they use in building portable refrigerators.

Left—One of the many Stewart-Warner Corporation war products are shell fuses. This 19-year-old youth is operating a Davis-Thompson machine.

Right—
At the request of Ordnance, Briggs Manufacturing developed a method of producing 75 mm. cartridge cases of steel. They use auto body presses.

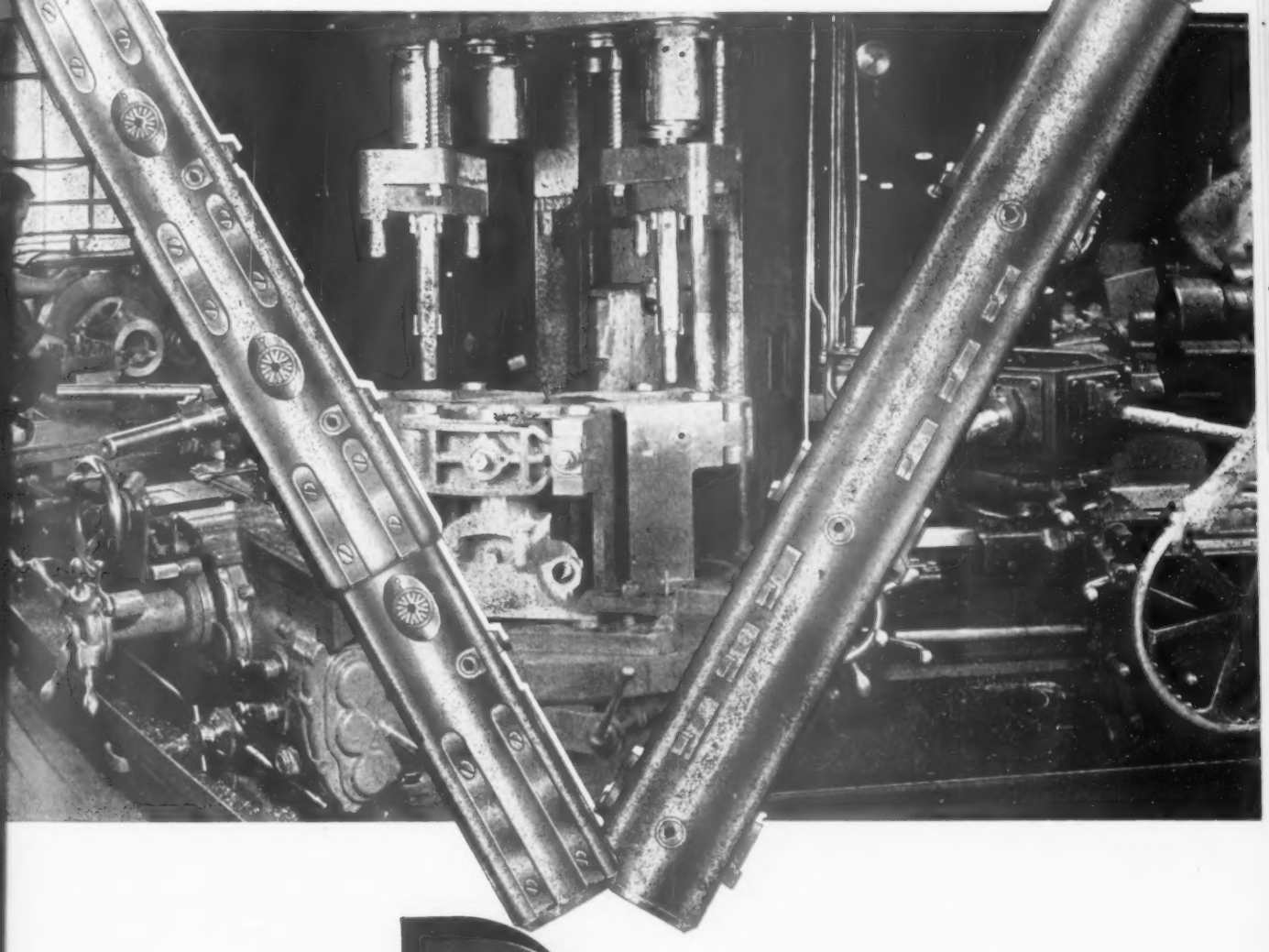
IT'S STILL A WAR OF PRODUCTION!

The margin of United Nation's production over that of the Axis is not yet equivalent to a one-way highroad to quick and easy victory.

LET'S KEEP ON PRODUCING!

DAVIS BORING TOOL DIVISION

LARKIN PACKER CO. • ST. LOUIS, U. S. A.



DAVIS

BORING TOOLS

Several TWIN-RAM HYDRAULIC UNITS ON ONE MACHINE CONTROLLED FROM *One Location*

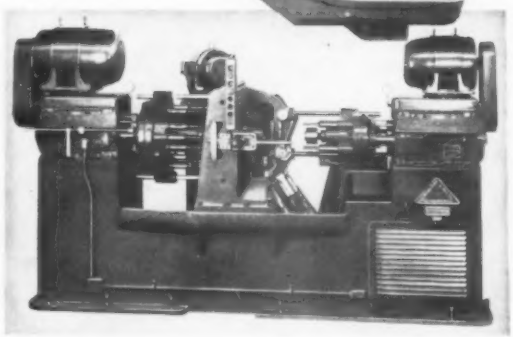
SELF CONTAINED—available either right or left hand—so when several units are mounted on one base to be tied together, operation can be controlled from one location. The operator is not compelled to walk around the machine to make adjustments.

The TWIN RAM Hydraulic Unit has high salvage value, for it can be lifted from one base on which it has served its purpose, and be placed on another base to provide power for a different job. Spindle speeds can also be changed to meet desired requirements.

The distinctive electrical control makes possible rapid advance, feed, dwell, and rapid return.

The unit is made in two sizes: Model 2000, which drills up to ⅞ inch diameter in machine steel (for single drill or equivalent for multiple drilling) and Model 5000 for drilling up to 2-inch diameter (for single drill or equivalent for multiple drilling).

Send for literature giving complete information.



Installation can be provided to take care of any conditions such as:

(1) Rapid approach, feed, rapid return.

(2) Rapid approach, feed, second rapid approach, then second feed, and rapid return.

(3) Rapid approach, feed, dwell, rapid return.

BUY WAR BONDS

LeMaire TOOL & MFG. CO.

2663 S. TELEGRAPH ROAD ▲ DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

CAPITAL COMMUNIQUE . . . BY JAY A BONWIT = WASHINGTON

T. M. REG. U. S PAT. OFF.

Special dispatch from THE TOOL ENGINEER'S *correspondent in the nation's capital.*

seeking to counteract the effects which cutbacks in production have had on industry.

The overall production program is cited as being on the increase, with current production rate running behind schedule. Peak production for this year will not be reached until December, with schedules during 1944 exceeding the highs for this year.

Greatest impact of cutbacks has been on sub-contractors. There are few large units which cannot be converted to other types of production for war within a comparatively short time.

Largest cutbacks have been in tank production, and in the case of one large railroad equipment producer who had been making tanks, orders for railroad equipment have pushed the tanks out of the plants. In another case, a producer of farm equipment, who had been converted to tank output, is back on farm equipment in full force. One large built-for-the-purpose tank plant is being converted to another use. In each case, the sub-contractors face a more difficult conversion problem than the prime contractor.

Some plants cannot be converted. These are few, and in practically all cases Government-owned. Shell and bomb loading plants are a good example of plant capacity that does not readily lend itself to conversion.

★ ★ ★

TOOL PRODUCTION AND DISTRIBUTION

In the machine tool production field, there is speculation as to the actual amount of production that will continue. There is a considerable demand for special purpose tools, despite the fact that plants have been tooled up to a major degree.

While the original demand was largely in general purpose tools, emphasis now is on specialized needs. Effort is being made to effect the redistribution of tools which have been made idle through cutbacks or changes in contract. Some of the Ordnance Districts have done an effective job of such redistribution. The problem is simplified for Ordnance, in that the tools are owned by Ordnance.

Considerable maldistribution of small tools is reported, with redistribution of such tools constituting a knotty problem. With several exceptions, small tool supply is becoming adequate.

★ ★ ★

MATERIALS FOR NECESSITIES

Recurrent rumor that material supply outlook has improved to the extent that consumer durable goods output will shortly be resumed, is entirely misleading.

Toward the end of this year, more materials may be released to civilian needs, but only such essential needs as transportation, farm equipment, and repair and maintenance of essential civilian services (plumbing, heating, etc.). These requirements are not considered as direct military, but are directly related to the war economy.

The relaxation on materials might even extend to production of a limited number of washing machines, considered necessary due to congestion of laundries. Gadgets are not in the picture.

★ ★ ★

(Continued on following page)

FOR HEAT TREATING

IN THE SHOP

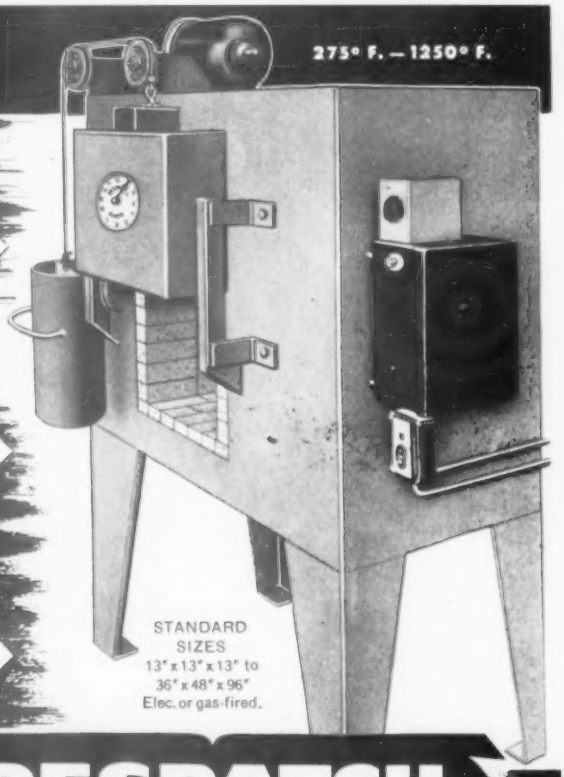
TOOLS, DIES & PARTS may be easily processed to correct Rockwell or Brinell every time. Improves quality. Very fast pre-heating, wide-range flexibility. For all heat-treating jobs in your shop.

IN THE PLANT

LARGE SCALE PRODUCTION is assured by high volume forced convection heating. Gives greater uniformity and control, faster heat penetration. Easily loaded, readily adaptable to any plant.

IN THE LABORATORY

METALLURGICAL TESTS may be made in less time and with greater accuracy. Supplies needed data promptly and may be used for the most exacting tests. Meets all requirements for research work.



STANDARD SIZES
13" x 13" x 13" to
36" x 48" x 96"
Elec. or gas-fired.

Free Bulletin 83 now ready. Ask for your copy today!

DESPATCH OVEN COMPANY MINNEAPOLIS

(Continued from preceding page)

MANPOWER AND ABSENTEEISM

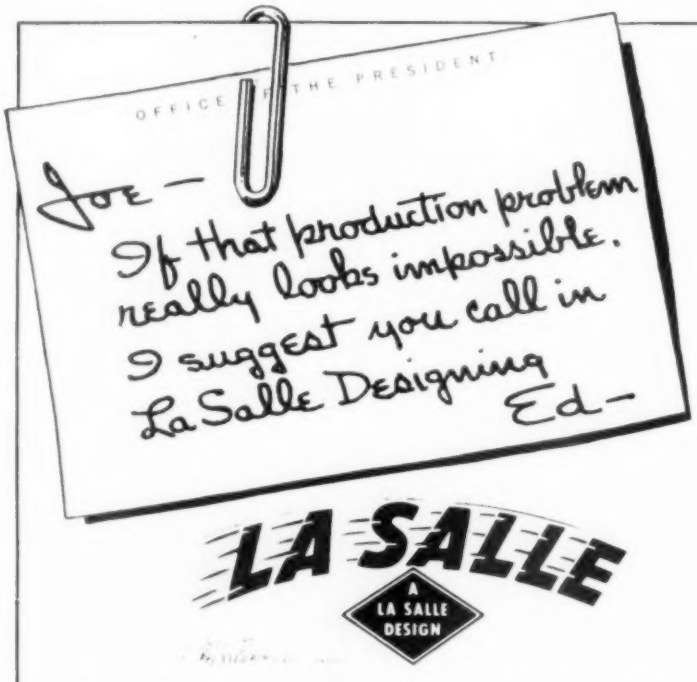
Manpower is considered the major production problem—with the armed services continuing to advocate national service legislation. War Manpower Commission is committed to continuance of the so-called voluntary basis of manpower controls, which seem expedient largely for political reasons. Military sources maintain that the War Manpower Commission regulations are utilizing the threat of Selective Service in a manner which was not intended under the law.

The labor force has been augmented by a large number of women, but surveys have shown that the absentee and turnover problems among women are greater than among men. This can be justified in many ways, and it is further true that the turnover and absentee rate is greater among new workers than among old workers, with women constituting a large portion of the new worker group.

However, the latter factor further points up the need for a more effective stabilization of industry's labor force.

* * *

WPB approach toward the labor problem is to bring labor further into the councils of production controls. Two new WPB vice chairmen (representing the AFL and CIO) have been appointed.


OFFICE OF THE PRESIDENT
Joe—
If that production problem really looks impossible. I suggest you call in La Salle Designing
Ed—

LA SALLE

A LA SALLE DESIGN

One of America's largest technical engineering organizations.

MANAGEMENT ENGINEERING

★ Tool Designing ★ Plant Layout and Routing

★ Process Engineering ★ Product Engineering

★ Designing of Jigs, Tools, Fixtures, Gauges, Dies and Special Machines.

LASALLE DESIGNING COMPANY

AL J. CONN, Managing Director

628 West Lake Street, Chicago

BRANCHES IN MILWAUKEE, DETROIT, LOS ANGELES

An intensive drive to expand the work of the War Production Drive is being launched. Objective is to combat slow-downs, and gain a more efficient use of manpower through agreement and council with the representatives of labor.

* * *

ORDERS FOR INDUSTRY

Recent actions of significance to the metal cutting industry were as follows:

May 20—Direction No. 5, CMP Reg. 1 was amended by WPB to clarify that the direction (prohibiting steel producers from shipping normalized or heat-treated carbon or alloy steel bars on any commercial warehouse order) applies only to carbon or alloy steel bars instead of all carbon or alloy steels, as had been previously stated.

May 22—WPB issued Order M-319, placing manufactured crude abrasive and abrasive grain under allocation by the Tools Division.

May 24—In an effort to provide a more uniform flow of supplies and to prevent a depletion of stockpile caused by increased requirements of strategic mica, Colonial Mica Corporation, agent of the Metals Reserve Company, has provided for a substantial increase in income to mine operators, especially those which produce mainly small sizes.

May 25—WPB Steel Division announced that future requests for tantalum, molybdenum and tungsten are to be made in terms of kilograms instead of pounds avoirdupois.

May 25—Conservation Order M-43 was amended by WPB to permit the use of tin for certain purposes formerly prohibited, including changes in the permitted tin contents in brass and bronze; use of pure tin coatings on all copper wire .0320" nominal diameter and finer and a 12 per cent tin alloy coating on thicker copper wire in some cases; limited use of tin and tin alloys for coating steel wire; unlimited use of tin in the manufacture of fusible alloys and dry pipe valve seat rings; use of lead alloy containing not more than 2½ percent tin derived from secondary sources for corrosion resisting purposes.

May 25—WPB amended Conservation Order M-303, permitting industrial users of calcium metal to obtain small quantities for consumer use.

May 26—On the basis of an improved lead position, WPB amended Conservation Order M-38 to make lead more readily available as a substitute for more critical materials. The order provides that only non-essential uses will be controlled by the order. The order does away with the 90 per cent limitation which existed on all uses, and provides that only List A items be prohibited from any use whatever.

May 31—OPA invited eight high executives in the tool steel industry to become members of a Tool Steel Advisory Committee which is being formed to confer with the OPA on tool steel pricing matters.

NEW WPB TOOL DIRECTOR

June 2—Appointment of John S. Chafee as Director of the WPB Tools Division was announced by Donald D. Davis, Operations Vice Chairman. Mr. Chafee had been Deputy Director of the Division and was formerly vice presi-

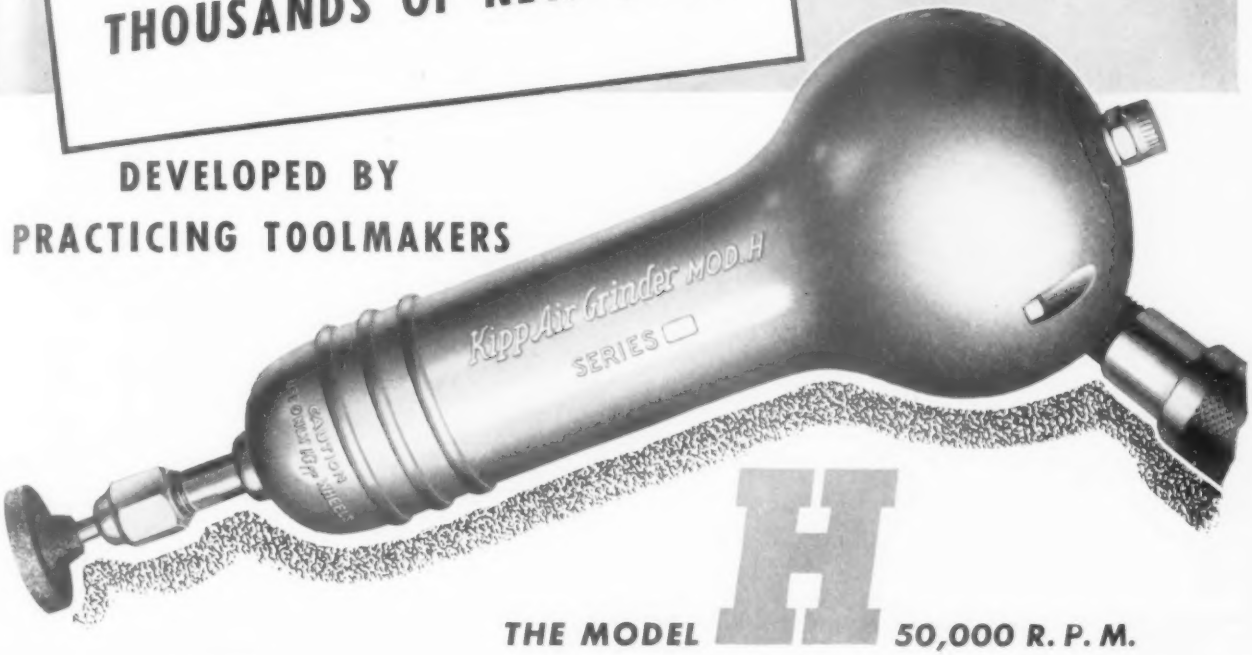
(Concluded on Page 136)

THOUSANDS OF NEW USERS,

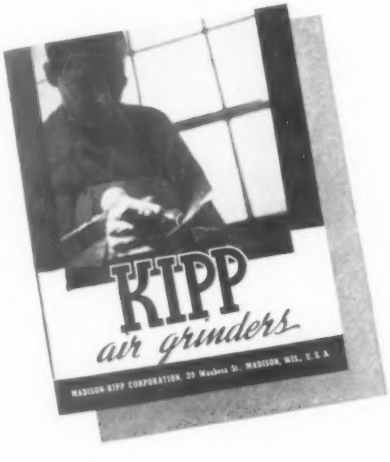
THOUSANDS OF NEW USES!

$29.75

DEVELOPED BY
PRACTICING TOOLMAKERS



THE MODEL H 50,000 R. P. M.



KIPP *air* TOOL CATALOG
IS *Yours* FOR THE ASKING

KIPP *air* GRINDERS

Every toolmaker, every tool crib, every machine and thousands of production jobs need a Model H, K or VT Kipp Air Grinder or all three of them. Because of expanded facilities the delivery position on high ratings has been measurably improved. Accessories in reasonable quantities can usually be shipped out of stock. Madison-Kipp Air Grinders were developed by practicing toolmakers so they *are* practical. They usually pay for themselves on a single job.

Sole Agent in England: Wm. Coulthard & Co., Ltd., Carlisle

MADISON-KIPP CORPORATION 209 Waubesa Street MADISON 4, WIS. U. S. A.

More production per worker!

Foot Control Leaves Both Hands Free To Work!

WANT more production? Follow the example of leading war plants — put *Speedy Air Vises* to work! This foot-controlled, pneumatic vise leaves operator's both hands free for safe, fast insertion and removal of work. You'll find it cuts time, labor and costs, reduces fatigue. Sturdy, compact, precision-built . . . so low in price it can be economically used on every drillpress, miller, filer and assembly line. Prompt delivery. Ask your distributor or write for details.

Features: *Vise opens and closes instantly . . . Remains open or closed without constant foot pressure . . . Exerts grip of 15 times air-line pressure . . . Measures 12 x 6½ x 6 in. . . . Jaw width 3 in. . . . Jaw depth 2 in. . . . Maximum opening 3 in. . . . Maximum travel ½ in. Attaches to air line or individual compressor.*

SPEEDY AIR VISE
complete with Foot Control Valve, Air Hose and Fittings **$24**

W. R. BROWN CORP.
5722 ARMITAGE AVE., CHICAGO, ILL.

AMERICA'S MOST TALKED-ABOUT VISE . . . AT A PRICE!

(Concluded from page 134)

dent of Brown and Sharpe Manufacturing Co., of Providence, R. I.

June 3—Schedule 4 was added to Limitation Order L-216 cutting the number of sizes in which rotary files are produced from 380 to 70. The schedule, part of a general program to simplify tools, is designed to save high alloy steel and speed production. The order specifies the sizes and shapes in which rotary files may be produced.

June 9—Use of the preference rating system for deliveries of steel is eliminated in an amendment to M-21, the basic order covering distribution of steel andiron products. This action was taken to take care of changes made necessary by full operation of the Controlled Materials Plan on July 1.

June 9—Priority Regulation No. 1 was amended to restore the rating of AA-2. This action was taken as a means of avoiding a new "super" priority rating.

June 15—OPA issued a specific dollars-and-cents maximum price schedule for ferro-chromium and chromium metal, contained in Maximum Price Regulation No. 407 (Ferro-chromium and Chromium Metal), effective July 1.

THE END

SHOP SAFETY:

•

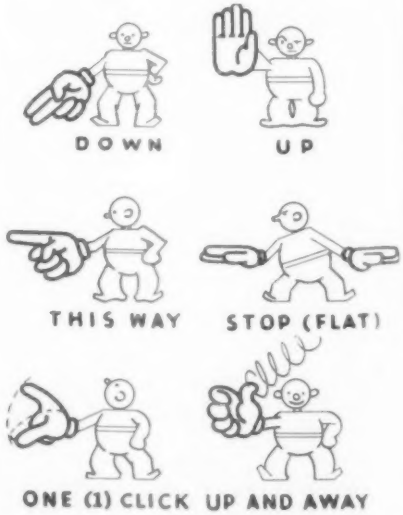
Standardized Crane Signals

The tank plant of General Motors' Fisher Body Division has published a standard set of hand signals for crane operations.

Many new men, it was found, were unfamiliar with crane work. Others had used signals differing from those prescribed in the tank plant. The signals, with illustrations, were mimeographed and copies were given to foremen, crane operators and hook up men. In addition to increasing efficiency, plant officials report, an obvious accident hazard has been eliminated.

Along with the signals, three rules were stressed: (1) Use these signals only; (2) Do not accept signals from more than one person; (3) Do not move crane until you are sure you understand the signals.

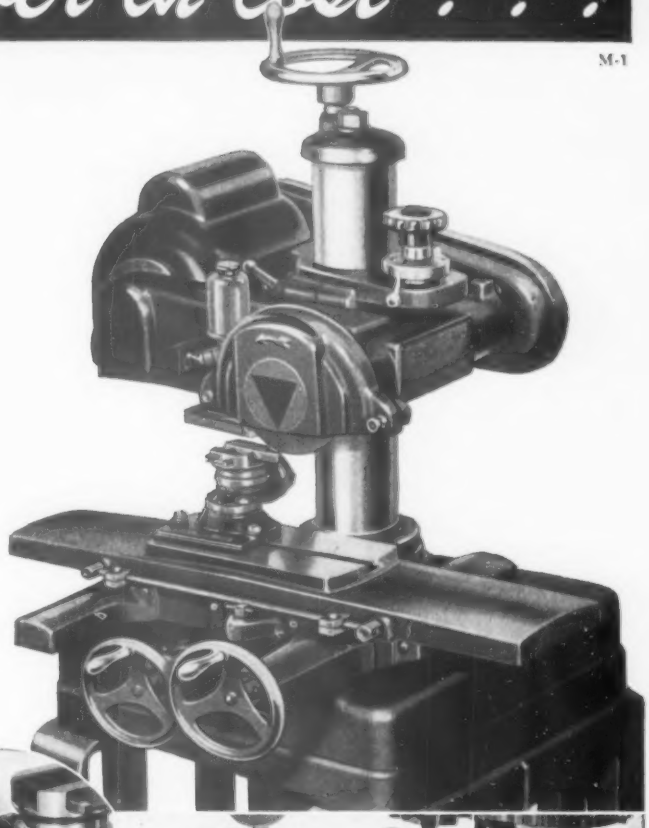
Fisher Body tank plant crane signals.



New Delta Chip-Breaker Grinder is simple, fast, dependable, accurate — and *much lower in cost . . .*

Gives all-around, long-time satisfaction in grinding the chip-breaker groove on carbide-tipped tools—used also for other production grinding

M-1



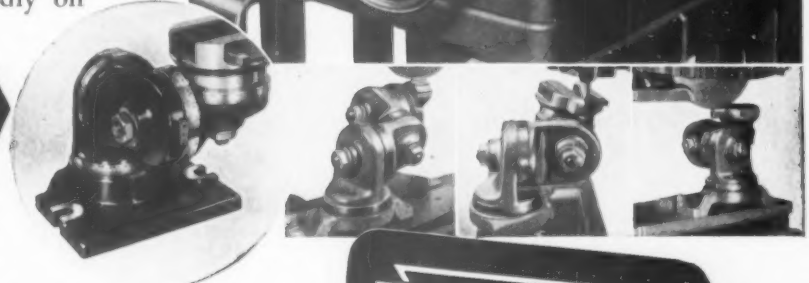
In grinders costing many times as much, you do not find many of the new, exclusive features you get in this latest Delta machine. It's husky, solid (weight 700 pounds), over 6 feet high, an accurate machine designed to turn out a big volume of work. Yet its cost is amazingly low.

Spindle shaft specially designed. Bearings widely spaced to provide permanently true alignment. Wheel mounting system permits removing either wheel alone, or wheel and adapter. Table is smooth operating with convenient control wheels — rides solidly on long ways.

Equipped with the new "UNIVISE"

. . . holds the tool at any conceivable angle

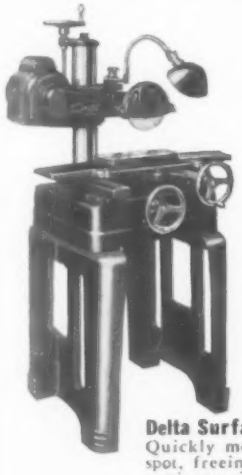
Four distinct planes of adjustment. Can be accurately reset at a moment's notice so that the tool may be reground at *precisely* the same angles as originally set. Saves time, wheel wear. Eliminates bothersome and often inaccurate measurements.



With Univise and coolant attachment removed, this machine may be used as a regular surface grinder.

The features and performance of this Delta machine are amazing to those accustomed to paying far more than its cost. Investigate — be first in your plant to discover the convenience and economy of this new Delta grinder. See it at your Delta industrial distributor's — check priorities and deliveries.

DELTA MILWAUKEE Machine Tools



Delta Surface Grinder
Quickly moved to any spot, freeing machines costing ten times as much.

TEAR OUT AND MAIL THIS COUPON FOR FULL DETAILS

THE ARMY-NAVY "E" — *awarded for excellence in the production of machine tools vitally needed in the war effort.*

THE DELTA MANUFACTURING COMPANY
610G E. Vienna Ave., Milwaukee, Wis.

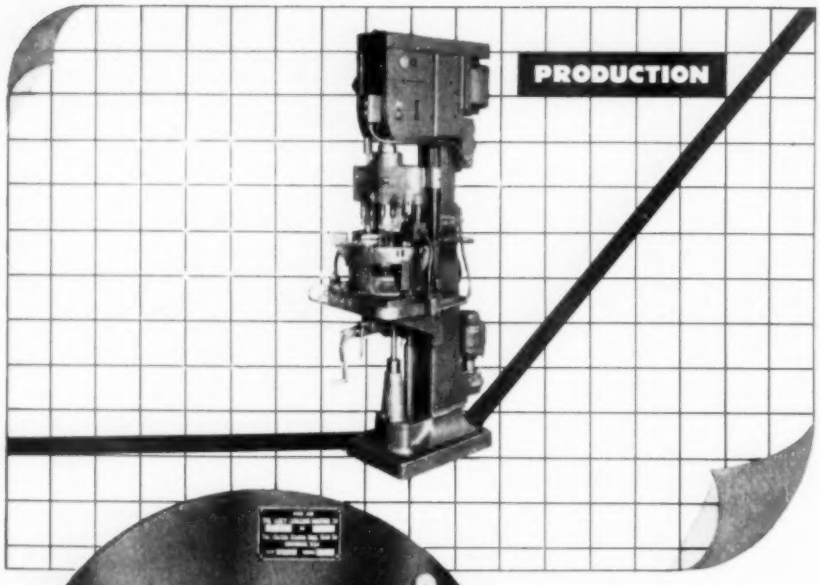
Please send me your new catalog giving full details on the Delta Chip-Breaker Grinder and your full line of low-cost machine tools.

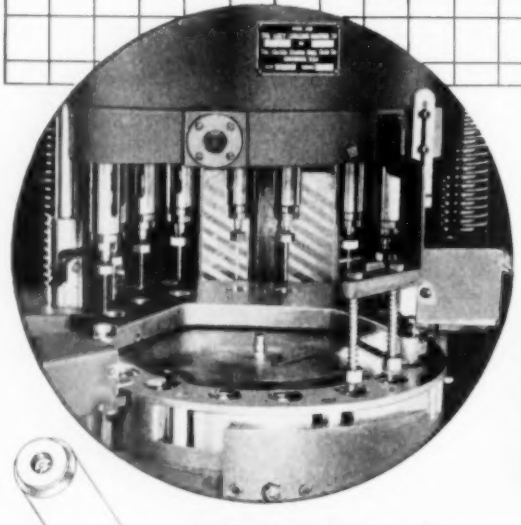
Name..... Position.....

Company.....

Address.....

City..... State.....





PRODUCTION: 2000 parts per hour, drilling two parts in each station, using No. 50 Drills.
MATERIAL: Brass.

PRODUCTION CHARTS GO UP WITH Avey DRILLING EQUIPMENT

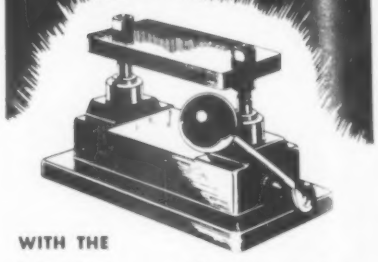
Your installation of our Avey Automatic equipment assures you—increased speed in production.

This Standard No. 1 Cam Feed Unit Machine, with Drill Head and Automatic Index fixture, is adaptable to many operations including Drilling, Reaming, Counter Boring and Tapping. *Send us prints of your requirements.*

THE AVEY DRILLING MACHINE COMPANY
CINCINNATI, OHIO • U. S. A.

Avey DRILLING MACHINES
CINCINNATI • OHIO

Cut Costs-Speed Up Tooling



WITH THE

Universal Jig Vise

Build your fixtures around this predesigned drill jig body. Helps you get into production quicker at lower cost. Savings in time up to 60% not uncommon.

FAST AND EASY TO OPERATE

Lever locks work instantly — holds securely. Throw it back and work is released. Saves cost of expensive drill fixtures — only a bushing plate and adaptor needed for each job. Hundreds of Universal Vises saving time and money on important war jobs.

Only $29.75 f.o.b. Chicago
Order today. Please include priority certification. Write for bulletin.

Distributed Nationally by
J. M. Short & Associates
Dept. 45, 53 W. Jackson Blvd., Chicago, Ill.
Mfg. by MOHR LINO-SAW CO.
130 N. Union Ave. Chicago, Ill.

RACINE

Variable Volume HYDRAULIC PUMPS

For automatic precision type machine control, where low or high pressures are required for either slow or fast operation. Oil pressures of 50 to 1000 lbs. per sq. in. at 0 to 30 G.P.M.—for holding, pressing, clamping, feeding and forming operations.

RACINE HYDRAULIC VALVES

With exclusive "Sleeve Type"—"Balanced Piston" construction. ⅜" to 1½" standard sizes with mechanical, electrical or manual control devices.

RACINE METAL CUTTING MACHINES

With Hydraulic Feed and Control features. For general purpose or production metal cutting. Capacities 6" x 6" to 20" x 20". Request complete information and prices. Our engineers will be glad to help you with your hydraulic circuit problems. Address Dept. TE-P.

STANDARD FOR QUALITY AND PRECISION

RACINE TOOL AND MACHINE CO.
RACINE, WISCONSIN

KoolPore

. . . for heavy cuts and fast removal of metal without burning. These BAY STATE highly porous and cool cutting grinding wheels for TOOL AND CUTTER and SURFACING jobs can't be beat! Try them.

BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

END MILLS AVAILABLE FROM STOCK

Some sizes and types of Putnam End Mills can be supplied immediately from stock. Your Putnam sales representative can tell you what are now available.

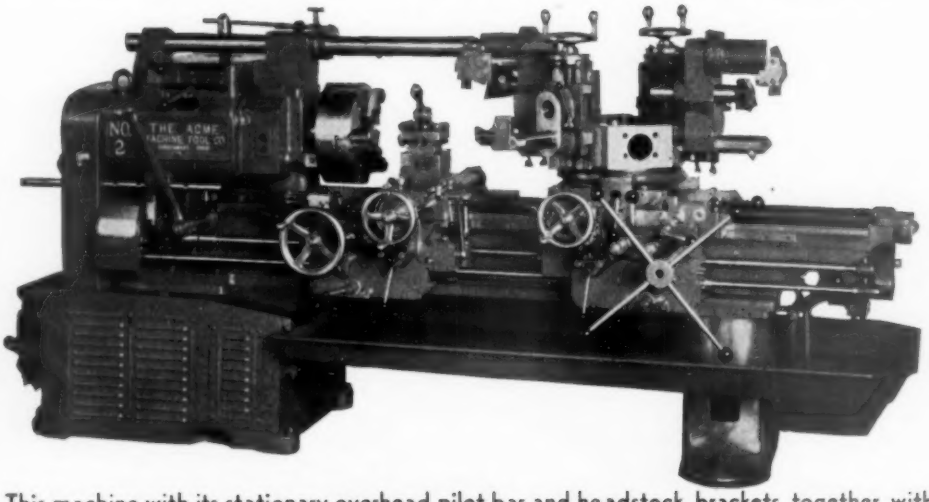
PUTNAM END MILLS FOR FINISH MILLING

Exceptional finish from the milling operation alone can be obtained by using Putnam Hi-Speed End Mills. These tools are of a design and quality that make them especially adaptable to operations involving high spindle speeds, precision movements, rotary head motion, or other difficult conditions. No matter what kind of a milling job you have, a Putnam Hi-Speed End Mill is always "the tool for the job."

PUTNAM TOOL COMPANY

2985 Charlevoix Avenue • Detroit, Michigan

RIGIDITY and ACCURACY
UNDER HEAVIER CUTS AT FASTER SPEEDS!



No. 2 Universal Turret Lathe with stationary overhead pilot bar and headstock brackets. Heavy duty multiple turning heads and vertical side tools and heavy duty reversible cutter holders. Also shown is the lead screw type chasing attachment with split nut brackets and threading dials on both carriages.

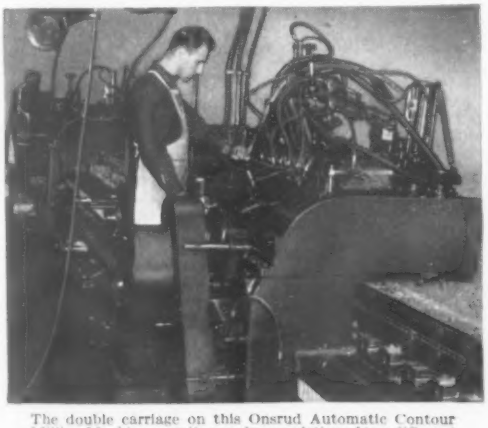
This machine with its stationary overhead pilot bar and headstock brackets together with rigid turret tooling permits heavy multiple cuts. Thus accuracy is assured, while faster speeds are possible through the use of cemented carbide cutting tools.

WRITE FOR COMPLETE DETAILS

THE ACME MACHINE TOOL COMPANY

CINCINNATI, OHIO

20′ channel beams and 8′ and 30′ cap strips are milled on this 30′ machine. A 45′ Onsrud A80-A can handle parts up to 38′ long. A 60′ machine will soon be completed for machining parts up to 48′ long in one set-up.



The double carriage on this Onsrud Automatic Contour Milling Machine permits speedy completion of two different sets of operations. It is only necessary to move work from one end of bed to the other.

Above machines are fully protected by patents issued and pending. All infringements of our rights will be diligently prosecuted.

In Milling Spar Beams

No Work Is Too Long

Aircraft tool engineers are turning to the Onsrud A80-A Automatic Contour Milling Machine in ever-increasing numbers. Here are some of the reasons why.

VERSATILITY—One to four operations may be performed simultaneously on the Onsrud A80-A, including vertical, horizontal and vari-angle milling.

ACCURACY—Cutter travel is guided by former bars at a 1 to 1 ratio. Accuracy to 1/1000 in. is easily maintained with a smooth-finish cut.

PRODUCTIVITY—Metal removal has reached speeds never before thought possible. Any length of table can be furnished to permit machining the full length of work in one set-up, whatever the length of the work might be.

SAFETY—Onsrud patented design prevents trapping of cutters. Tool breakage and work spoilage is held to a minimum.

The Onsrud A80-A with its high cutting speed, automatic template cutter control, and fast automatic G.E. Thy-mo-trol feed has solved *every* spar beam machining problem that has ever been assigned—*no matter* how complex the part. Investigate the application of the A80-A to your operations by writing today for full information.

ONSRUD MACHINE WORKS, INC.

3927 Palmer Street, Chicago, Illinois

Sales Offices in all Principal Cities

Onsrud

THE DESIGN OF TOOLS AND FIXTURES IS A PART OF THE ONSRUD SERVICE

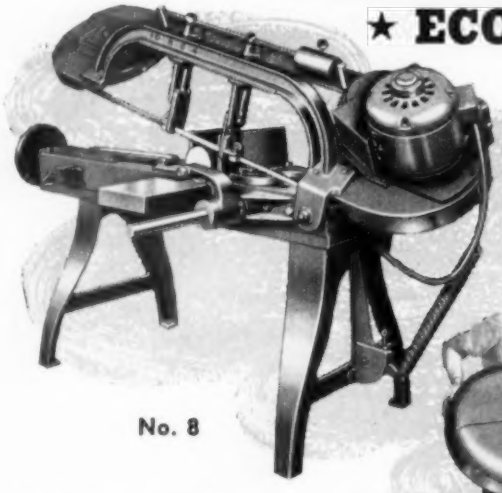
12 Reasons Why

WELLS METAL CUTTING BAND SAWS DO THE JOB

★ BETTER

★ FASTER

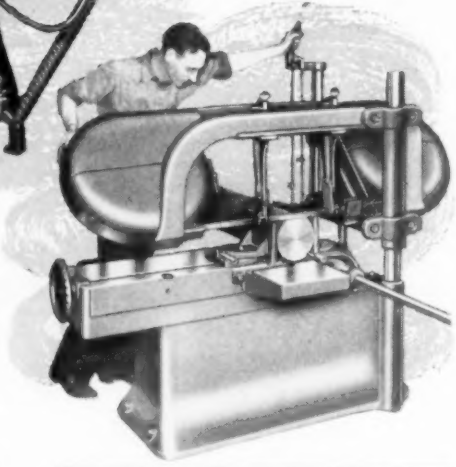
★ ECONOMICALLY



No. 8

Wells SAWS

No. V-12



1. Heavy rugged construction.
2. Vibrationless operation means truer, faster cutting.
3. Guides on heavy precision machined I beam.
4. Will cut most metals including stainless steel.
5. Produces maximum cutting speeds.
6. Saw blade runs cool at high speeds.
7. Regulated speeds 30 — 90 or 130 feet per minute.
8. Low initial cost plus capacity and quality.
9. Minimum of moving parts.
10. Low power consumption.
11. Small floor space.
12. Wells Metal Cutting Saws assure fewer man hours per job.

See your mill supply dealer or write direct.

Write for copy of new Wells Catalog

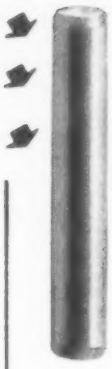
Well Has Established Leadership

SPECIFICATIONS	
WELLS NO. 8 METAL SAW	
Capacity: Rectangle	8" x 16"
(spec. bowed guides)	5" x 24"
Rounds	8" dia.
Speeds: ft. per min.	60, 90, 130
Motor	Specifications optional
WELLS NO. V-12 METAL SAW	
Capacity Rectangle	13" x 16"
Round	13" dia.
Speeds: ft. per min.	50, 90, 150
Guides	Adjustable
Feed	Hydraulic-Controlled
Vise	New quick acting type
Motor	Specifications optional

WELLS MANUFACTURING CORPORATION

Wells METAL CUTTING BAND SAWS

1212 MONROE ST. • THREE RIVERS, MICHIGAN



DANLY *Precision* DOWEL PINS

All Die Makers' Supplies

Danly Precision Dowel Pins

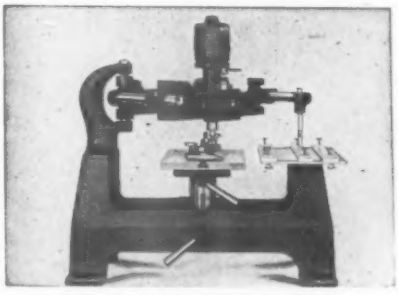
Danly Commercial Sets

Danly Special Sets

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Ducommun Metals & Supply Co.
Los Angeles • San Francisco

DANLY PRECISION DIE SETS

For Precision Marking In War Production . . .



ENGRAVER
PANTO ACID ETCHER
ELECTRIC MARKER

. . . three machines in one

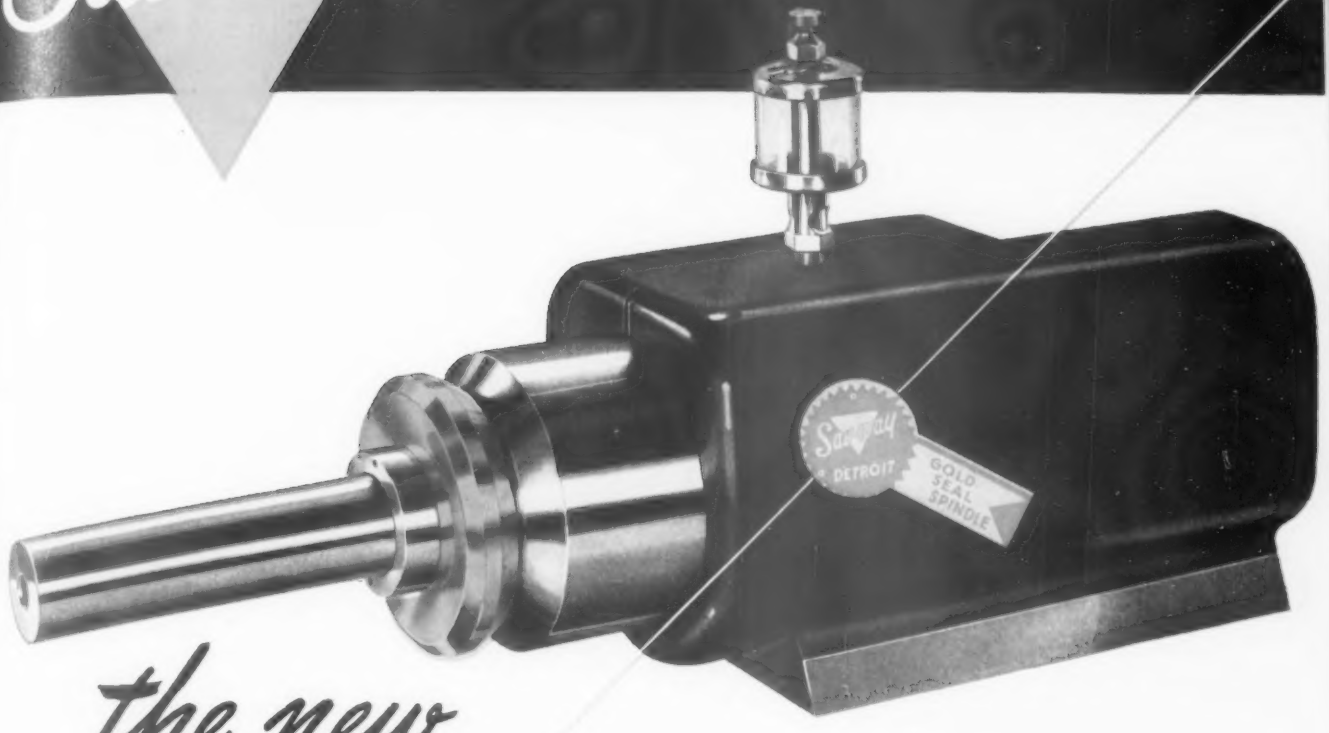
A compact precision bench-type pantographic machine, with interchangeable heads . . . for engraving instrument dials, name plates, etc. . . . and for acid etching or electrically marking tools and parts—heat-treated or annealed—on flat, concave, or convex surfaces.

Illustration shows machine with engraving head attached.

» *Write for Literature*

H. P. PREIS ENGRAVING MACHINE CO.
161C SUMMIT ST. NEWARK, NEW JERSEY

Sav-way announces



the new Gold Seal Spindle

The Spindle that Breathes!

In the Gold Seal Spindle an ingenious modification of the oil intake admits an air-oil mist, through filters, to the body around the shaft. This lubricating mist is constantly drawn through the moving parts, fore and aft, by the pumping action of the exclusive Sav-Way centrifugal labyrinth seals. This flow automatically excludes dirt and coolant from the spindle.

Maximum service life is further assured by holding torsional vibration and unbalance to an absolute minimum. The rigidity essential to smooth running, high accuracy, and satisfactory finish, is achieved by using the finest of selected extra-precision bearings, applied in pre-loaded duplex pairs. The massive housing is engineered to provide automatic compensation for contraction and expansion. All component parts are deep-frozen to eliminate strain and provide accelerated ageing, with the result that precision alignment is permanently maintained.

The Sav-Way Gold Seal Spindle—the spindle that breathes—has already won its laurels in round-the-clock war production. It will do the same kind of efficient, trouble-free job in your plant!

For a Pre-view of the New Gold Seal Spindle, Attach this Coupon to your Letterhead.

SAV-WAY INDUSTRIES
Box 117, Harper Station (13), Detroit, Michigan

Please send detailed description of the Gold Seal Spindle.

Name _____
Firm _____
Address _____
City _____ State _____

Keep an Eye On

Sav-way INDUSTRIES
★ Machine Tool Division ★
4875 EAST EIGHT MILE · DETROIT, MICHIGAN

. . . you'll certainly want this *NEW*

HYDRAULIC CYLINDER CATALOG!

IT is packed full of the information you need to select the *right* hydraulic cylinder *quickly*. Containing complete cylinder specifications, engineering data and charts, the new catalog is an informative time-saver for busy engineers.

Send for your copy today—it's free to executives and engineers. When you write, tell us about your Hydraulic Cylinder applications.

HANNA ENGINEERING WORKS
1765 ELSTON AVENUE • CHICAGO, ILLINOIS
RIVETERS • CYLINDERS • AIR HOISTS

IS *CHROMIUM PLATING* YOUR ANSWER TO EXTENDING THE LIFE OF VALUABLE TOOLS AND EQUIPMENT?

SALVAGE for example...

CHROMIUM PLATING may reclaim many parts when worn or machined off-size

THE PROBLEM of replacing parts of worn equipment and production tools is frequently solved by building up the worn areas with chromium. Many plants also use chromium plating to reclaim parts which have been machined off-size and would otherwise have to be scrapped. Time and material saved in this way are especially important to the war effort. In addition, the reclaimed part often lasts several times longer than the original piece due to the hardness and wear resistance of the chromium plated surface.

For example, one plant salvaged several hundred cut and draw punches with off-center punch bearings by grinding them oversize and then chromium plating. Another had just completed an order for 700 spindles when the specifications were changed. Too small by several thousandths, they were salvaged by building up with chromium. Steel shafts on pumps handling corrosive liquids had to be replaced every few months . . . Reclaimed by chromium plating, they have shown no sign of wear in three years!

FOR MANY OTHER PARTS AND TOOLS

These are just a few of countless ways that chromium plating saves valuable materials and man-hours today . . . by extending the life of a wide variety of surfaces subject to wear and corrosion. Successful applications for both new equipment and salvage include:—coating and drying rollers, molding and mixing equipment, ball and roller bearing parts, cylinders, cylinder liners and piston rings, shafts, axles, pistons and many types of taps, dies, reamers, spindles, fixtures and gauges.

◀ **Booklet describes these applications in detail**

"The Last Thousandth of an Inch" will assist in determining the application for chromium plating on your products and equipment. In writing for your copy, please mention The Tool Engineer.

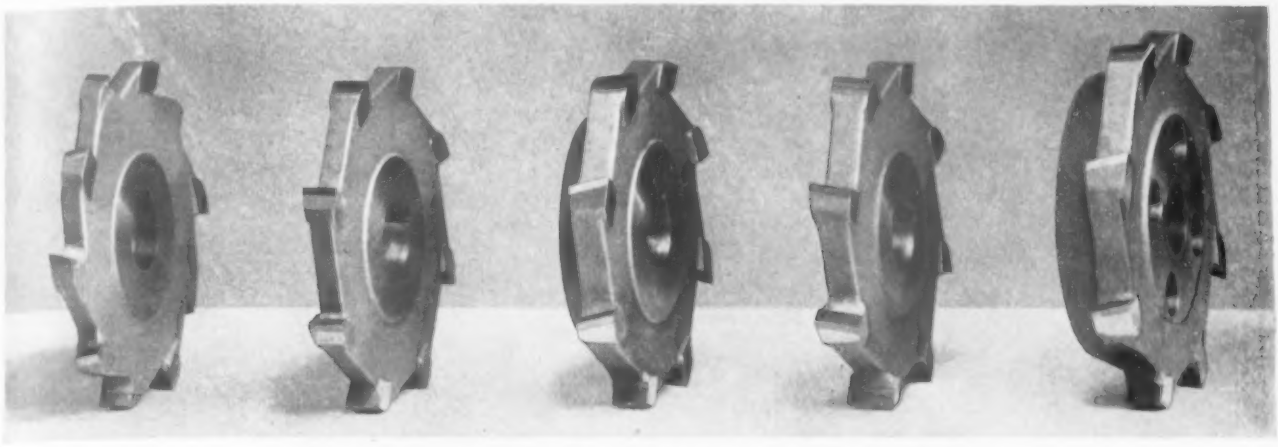
UNITED CHROMIUM
INCORPORATED
51 East 42nd Street, New York, N. Y.
Waterbury, Conn. ☆ Detroit, Mich.

YOU CAN'T GET A MILLING MACHINE TODAY

but you can

GET GRAYSON-KENNAMETAL CUTTERS

for more milling with fewer machines



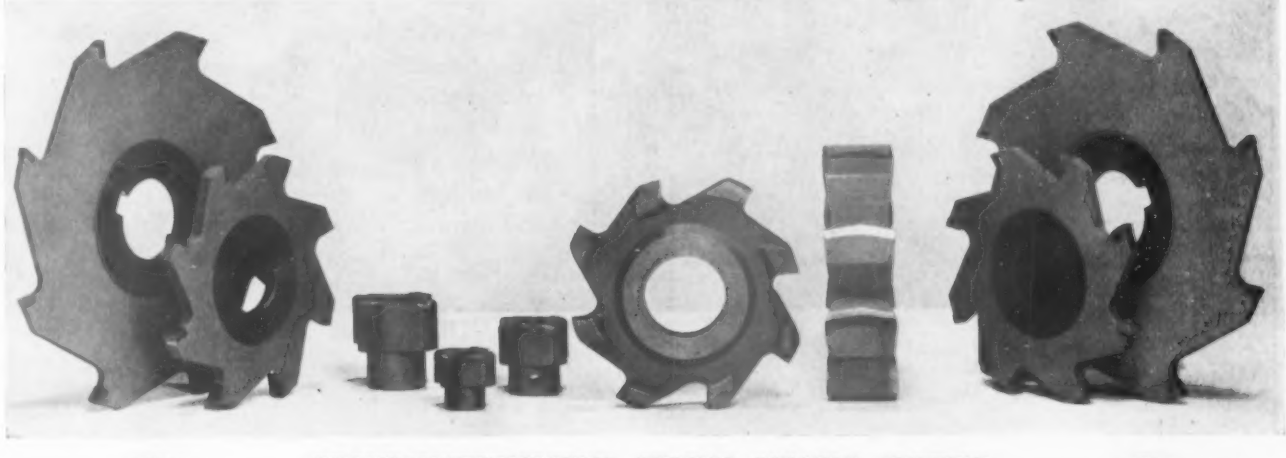
GRAYSON-KENNAMETAL STANDARD MILLING CUTTERS
TO MEET YOUR DELIVERY DEMAND

Heretofore, production engineers have resorted to tungsten carbide milling cutters only to solve "trouble jobs." Now, however, an ever-increasing number of machine shops are tooling up completely with carbide cutters, and are using them to machine *all* metals.

As an answer to wartime demands for increased production with no increase of equipment, carbide cutters are producing amazing results. Grayson-made cutters have stepped up cast iron jobs to as much as a thousand surface feet per minute, and 32" feed per minute—*1,000% increase* over the performance of previously used cutters!

The limits in speeds and feeds for Dural, bronze, and similar nonferrous metals have not yet been found. Present records on aluminum are 10,000 surface feet per minute and 150" feed per minute (capacity of the machine). Although standard milling machines often limit speeds and feeds, in *all* cases the natural wear resistance of tungsten carbides will produce as many as 1400% MORE PARTS PER GRINDING on these nonferrous metals!

The Grayson Manufacturing Company manufactures a line of standard tungsten carbide milling cutters which are available for shipment within five to fifteen days. Special cutters, to meet the customer's specific needs, can be made with excellent delivery.



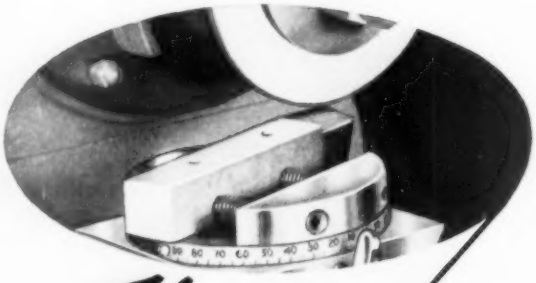
GRAYSON-KENNAMETAL SPECIAL MILLING CUTTERS
ENGINEERED TO YOUR SPECIFIC REQUIREMENTS

U. S. AND BRITISH
PATENTS PENDING

Grayson Manufacturing Company

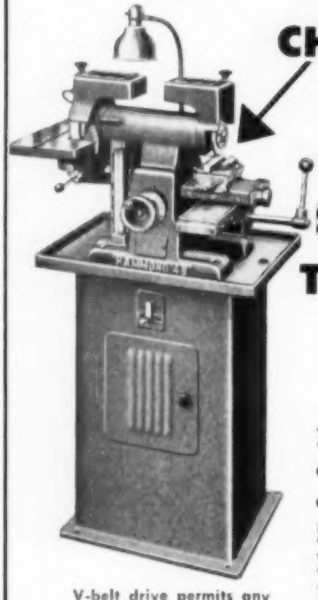
FACTORY AT
MONROVIA, CALIFORNIA

GRIND CHIP BREAKER GROOVES FAST AND ACCURATELY



WITH A

Hammond



V-belt drive permits any electrical specifications

CHIP BREAKER GRINDER DESIGNED SPECIFICALLY TO DO JUST THAT!

Do you tie up millers or surface grinders for carbide tool grinding jobs? Don't do it! . . . Investigate the new Hamond 4-B . . . built specifically to grind chip breaker grooves easier, faster, better. Write today for BULLETIN 201 which shows how you can get *complete* and *proper* carbide tool maintenance.

CHECK BULLETINS DESIRED, AND RETURN

- ☐ Chip Breaker Grinders
- ☐ Carbide Tool Grinders
- ☐ General Purpose Grinder
- ☐ Heavy Duty Grinders
- ☐ Abrasive Belt Grinders
- ☐ Automatic Polishers
- ☐ Cylindrical Polishers
- ☐ Polishing Lathes

Hammond Machinery Builders INC.
KALAMAZOO • MICHIGAN

1636 DOUGLAS AVENUE
Eastern Branch—71 West 23rd Street, New York, N. Y.

IMMEDIATE DELIVERY FROM STOCK ON STANDARD SIZES

★

GALTER

HIGH GRADE TOOLS

DEPENDABLE PERFORMANCE *Guaranteed*

Plain Milling Cutters
Side and Face Milling Cutters
Stagger Tooth Side Milling Cutters
Shell End Mills
Slot Cutters
Taper Shank Cutters
Spiral End Mills
Counterbores
Countersinks
Reamers
Hollow Mills
Taper Shank Drills
Straight Shank Drills

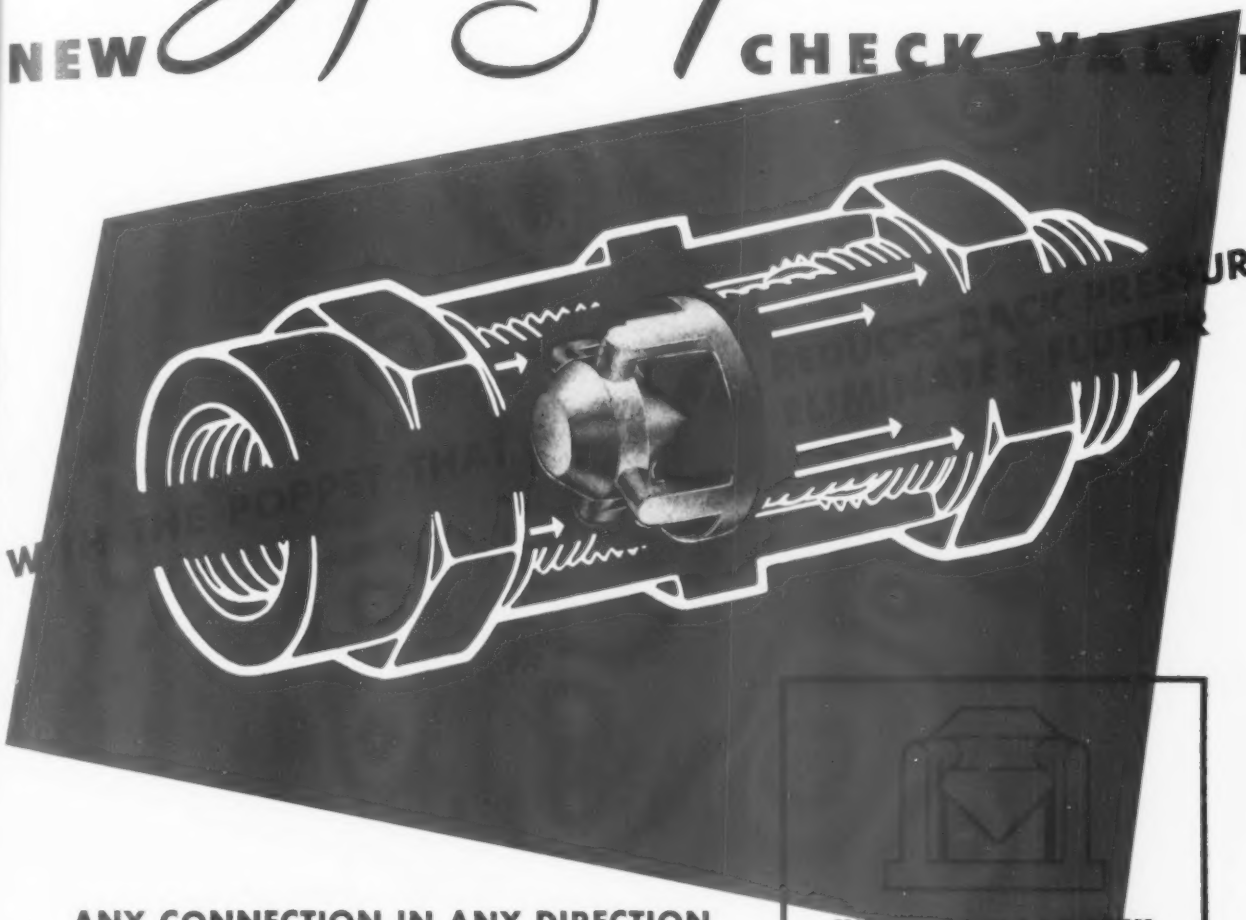
Prompt Delivery on Special Tools, Dies, Jigs And Fixtures Made To Your Exacting Requirements

Write for prices on standard sizes or submit blueprints for special quotations.

Galter Manufacturing Co.
711 W. Lake Street • Chicago, Ill.

A·S·P

NEW CHECK VALVE



ANY CONNECTION IN ANY DIRECTION

Engineering initiative in the application of the principle of interchangeability has produced the new A.S.P. Universal Check Valve for Aircraft Hydraulics. By the use of a standard body, made of heat treated aluminum alloy, and two of any three types of adapters, six basic combinations of connections are possible with flared tubing or internal or external pipe threads.

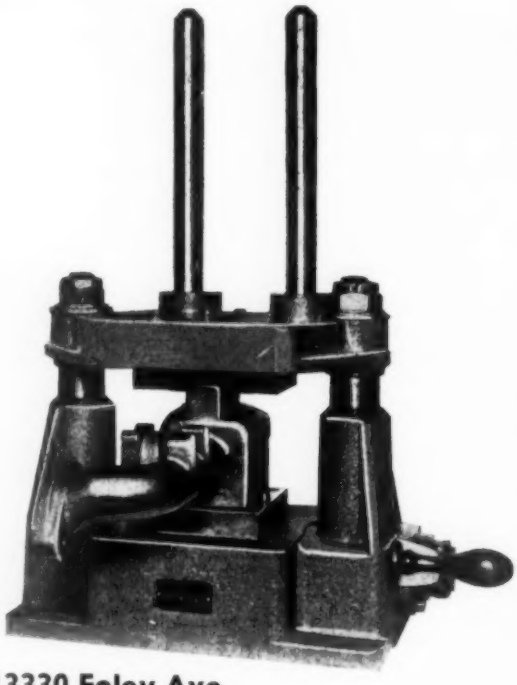
Each adapter is provided with a seat for the phenolic poppet (details at right). By reversing the position of the poppet, or by reversing the Valve assembly, the direction of flow can be changed, making 12 possible combinations. Simplified design has reduced weight 16%. Send for catalog.

FEATURES

1. Small cone diameter, plus cone in the Poppet streamlines the flow.
2. Fewer vanes, plus a radius on the cone end of the vanes materially reduces resistance.
3. Poppets will operate in any position, are unaffected by vibration or variable pressure.
4. Laboratory tests to 50,000 reciprocations at 275° F. developed no breakdown nor distortion.

AMERICAN SCREW PRODUCTS

7000 AVALON BOULEVARD • LOS ANGELES, CALIFORNIA



TOOLING ECONOMY

WITH STANDARD FIXTURES YOU ECONOMIZE IN ENGINEERING, CLAMPING TIME, AND RETOOLING COSTS

ASK FOR CATALOG 941

A Swartz standard L L Type fixture is shown equipped with adapters for chucking an intake manifold to drill inlet and two bolt holes in carburetor flange. Guide bars are shown arranged for multiple head.

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley Ave. — **Detroit, Michigan**

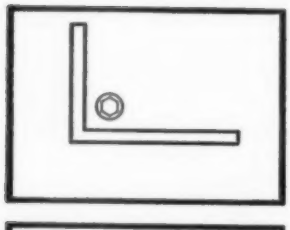
Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Tulsa, Okla—Brammer Machine & Tool Service Co., Inc.

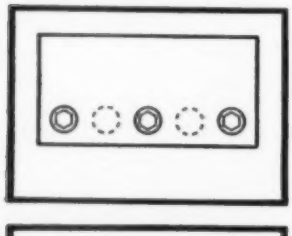
Represented by

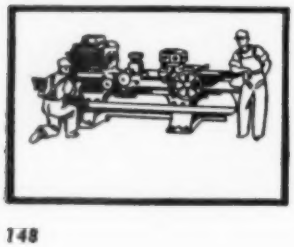
Chicago—Ernie Johnson
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
St. Louis—Mill Supply & Mach. Co.

Oneida, N. Y.—W. F. Himmelsbach
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

Yes, these screws save Time and Space!







No matter how close to a corner or flange you put Mac-it hexagon socket screws, there's plenty of room to drive them. This feature saves space.

* * *

Mac-its are heat-treated to give far greater strength than plain steel screws. With that extra holding power, you may be able to use fewer screws — save drilling and tapping time.

* * *

Production tie-ups because of broken screws are not necessary evils. Chances are that standard Mac-its will solve the problem.

Mac-its

PRONOUNCED "MACK-IT"

4311

OTHER MAC-IT PRODUCTS INCLUDE:

Socket head and hexagon head cap screws, stripper bolts, hollow and square head set screws, hexagon socket pipe plugs.

Strong, Carlisle and Hammond Company
Cleveland • Ohio

HELPING THE *Aircraft Industry* DO MORE THAN *THE EXPECTED* *

WESSON
Carbide Cutting Tools
If it's tough metal, you'll want Wesson Carbide Cutting Tools —for special or standard jobs—for single or multiple setups.

*More than the expected? Right! Today our Aircraft Industry is out in front — *ahead of schedule* — and the biggest production job ever tackled by any industry is practically "licked."

Pioneering, meeting every challenge, Wesson Carbide Cutting Tools have helped to make this possible—by making short work of extra precision jobs on toughest metals and alloys—*with fewer setups, greater speed, bigger bites, and a minimum of rejects.*

The new metal cutting standards set by Wesson in aircraft motor production will be the "yardstick" of performance for machine tools of the future. . . The counsel of Wesson engineers—skilled in engineering and designing of cutting tools—is available to help solve present war production problems, or for post-war planning.

WESSON CO., DETROIT, MICH. (Ferndale Station)

IN HAPPIER DAYS TO COME we will all have better, safer automobiles — more efficient refrigerators, washing machines and vacuum cleaners . . . . farmers will have better, stronger tractors and other tools and machines . . . . aircraft will continue to set new standards in speed, comfort and safety . . . . all made possible, in part, by the Wesson development of Carbide Cutting Tools to such high standards that they cut tougher metals than ever before — with greater precision — and at greater speed.

J. K. SMIT & SONS

157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit, Mich.

INDUSTRIAL DIAMOND TOOLS

Keep Your Surface Plates Accurate

Lombard re-scraping makes your old Surface Plates as good — and often times better-than new. All of the facilities which have made Lombard inspection plates a symbol for accuracy are now available for re-scraping, and machining old Surface Plates. This includes heat treating when necessary and essential hand work. Prices are reasonable and costs at a minimum. Prompt delivery.

LOMBARD GOVERNOR CORPORATION

100 MAIN ST., ASHLAND, MASS., U. S. A.

Precision . . .

In One Single High Speed Operation

Propeller hubs being spline broached.

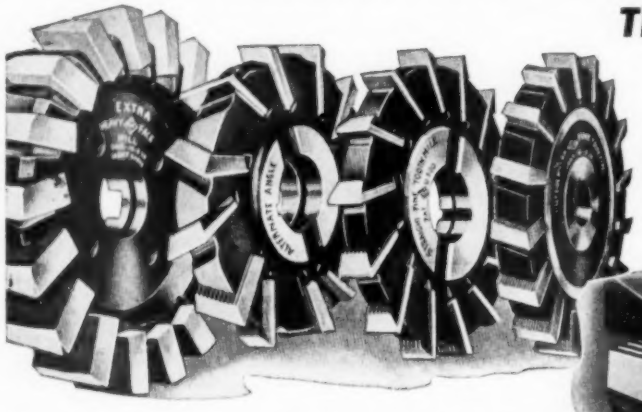
Only by broaching can these propeller hubs be made by a single operator at one time on one machine. This is but one of the advances that Lapointe has added to modern machine production by broaching.

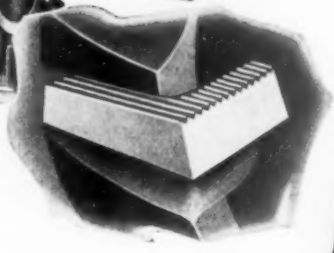
Lapointe horizontal machine spline broaching..

The LAPOINTE MACHINE TOOL CO.

HUDSON, MASSACHUSETTS

In The Business of WAR, Use Tools That "FIGHT"!





TIME SAVED MEANS SCHEDULES MET!

No modern battle is won with cross-bows and battering rams! And no one should attempt to handle war production with antiquated cutting tools. O K Inserted-Blade Metal Cutting Tools are tools that "fight," because they place at the operator's disposal an adequate supply of highest quality, properly ground cutting edges. That's "ammunition" that speeds up the work. And as only the blade or tool bit is made of high speed steel, the drain on that valuable metal is reduced to a mere trickle!

THE O K TOOL CO., SHELTON, CONN.

These Tools CONSERVE H. S. STEEL

THE TRADE OK MARK SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

O K Tools bought now for war work will be just as valuable in your coming peace time program, hence are a wise investment, not a war time expense.

LET'S FINISH THE JOB THIS TIME!

A HILL HYDRAULIC SURFACE GRINDER WILL HELP

★ Concentration of Man Power plus Machine Efficiency will win the War. Undoubtedly your production operations can be accelerated by using HILL *"Open Side"* Hydraulic Surface Grinders. HILL Heavy Duty Grinders are ideal for production operations—incorporating the two vital characteristics of speed and accuracy. They are built to *FINISH THE JOB!* Our experienced staff will assist you in selecting the correct type of HILL *"Open Side"* Hydraulic Surface Grinder best suited to *your* increased production needs.

18" x 18" x 60" HILL *"Open Side"*, Vertical Spindle Surface Grinder, with 12" x 48" HILL Rectangular magnetic chuck, operating in a Canadian munitions plant.

The HILL ACME CO.

6400 BREAKWATER AVE. • CLEVELAND, OHIO

HILL *"Open Side"* Surface Grinders are built in both Horizontal Spindle and Vertical Spindle types in a full range of sizes with table dimensions 18", 24", or 30" wide and 5 to 20 feet long.

FINISHED with EGYPTIAN

Simple as "One, Two, Three!"

There's real satisfaction in finishing a fine machine tool with the new EGYPTIAN Machine Tool Finishing System. Casting craters, those unsightly little pock marks on the surface of every casting, are well hidden by the stipple.

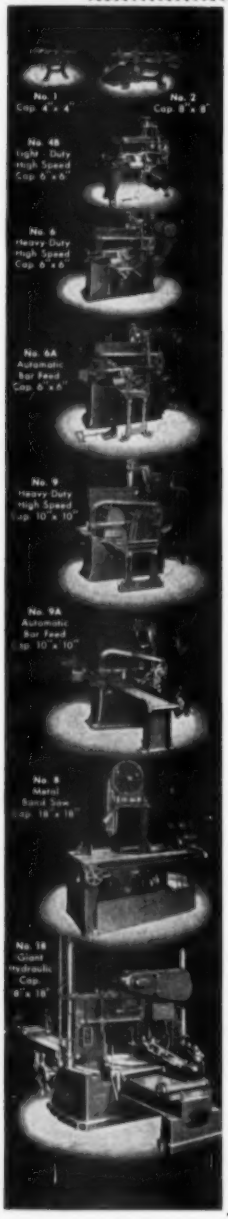
Three simple steps are all that are needed to obtain protection and good appearance with speed and economy. 1. Apply one pressure pot spray to bare casting—no primer. 2. Apply stipple over first coat. 3. Apply one coat of EGYPTIAN Machine Tool Enamel.

Pattern may be varied or a smooth finish produced—as desired. This finish air dries and conforms to WPB Limitation Order L-108.

THE EGYPTIAN LACQUER MANUFACTURING COMPANY
ROCKEFELLER CENTER, NEW YORK, 20, N. Y.

EGYPTIAN FINISHES

EGYPTIAN
Superior FINISHES



Cut anything that will go between the jaws

This is one of five No. 18 MARVEL Giant Hydraulic Hack Saws used by a well known Texas tool company to cut-off "multiple bars of alloy steel in round, square, and flat shapes, up to the maximum capacity of the large work-throat (18"x18")".

These super hack saws are designed for the largest sizes, and toughest steels — up to 18" x 18". After a year's heavy duty service, when asked as to the effectiveness of these saws in solving the cutting-off problems at this plant, the mechanical engineer in charge reported them "very effective."

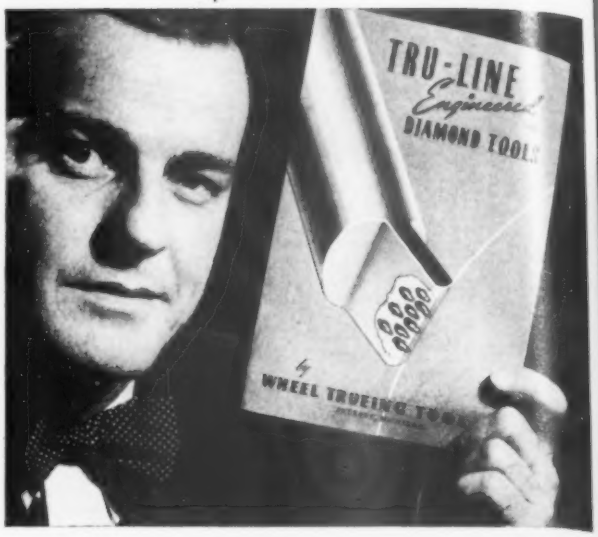
Buy from your local distributor

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

Eastern Sales Office:
225 Lafayette St., New York



Here's Your Guide to Lower WHEEL DRESSING COSTS!

Of course you will want to know more about this new Tru-Line Principle of wheel dressing! The coupon below will bring you the facts about Tru-Line multiple-diamond Tools for straight, profile and step dressing operations—the tools that are amazing production men by their accuracy, their ability to speed production, and by the almost unbelievable savings in time and production costs they are accomplishing.

SEND FOR THIS NEW BOOK TODAY!

Name _____

Company _____

Address _____

City _____ State _____

WHEEL TRUEING TOOL CO., INC.

3200 W. DAVISON DETROIT, MICHIGAN

DIAMOND TOOLS FOR
STRAIGHT, FORM, THREAD AND RADIUS DRESSING;
TURNING • BORING • GAGES • CORE DRILLING

to hold that line—

OILGEAR

In this welding positioner Oilgear Fluid Power solved 6 difficult design problems.

on a 50-ton steel shape or on a sheet of cellophane

THERE is a world of difference between holding the hairline register in printing flimsy cellophane and holding a line in the automatic welding of a 50-ton steel shape. But the fact that Oilgear Fluid Power has solved these and far more varied problems makes it seem certain *your* particular problem will yield to the versatility and flexibility of this proven power application system.

Here are just a few of the functions Oilgear Fluid Power will provide . . . steplessly and infinitely variable speed control of moving members . . . force *without* movement . . . a simple means of applying great power . . . the synchronizing of a number of motions . . . perfect sequence or cyclic operation.

For a quarter of a century Oilgear Engineers have applied these and other Oilgear Fluid Power functions to hundreds of different machines and mechanisms in hundreds of different ways . . . with results which often have been amazing. Oilgear Engineering know-how and Oilgear Fluid Power adaptability may provide just the answer you are looking for in that machine you are going to bring out. Now is the time to see. The Oilgear Company, 1308 W. Bruce St., Milwaukee, Wis.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R P M or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

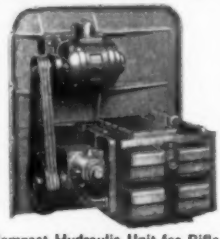
OILGEAR

Fluid Power

Before your new machine designs go into the shop...

CHECK THE ADVANTAGES OF HYDRAULIC UNITS LIKE THESE

When designing, or redesigning, your machines, obtain the advantages of hydraulic actuation by simply applying Barnes Complete Unit-Type Hydraulic Structures. Any combination of feed, traverse, clamping, indexing, etc. that you need comes in compact self-contained units or panels ready to install.



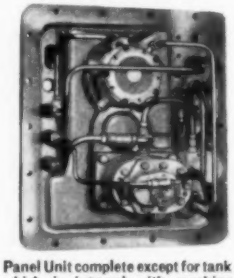
Compact Hydraulic Unit for Rifle Chambering Machine

COMPLETE CIRCUITS FROM ONE SOURCE There is no need for securing pumps, valves and cylinders from various sources. Barnes complete circuits are designed and built from standard hydraulic elements — pumps, valves, etc. All elements come from one source — eliminating divided responsibility for the performance of your machine.

Complete Hydraulic Unit for Special Purpose Machine

TWO TYPES AVAILABLE

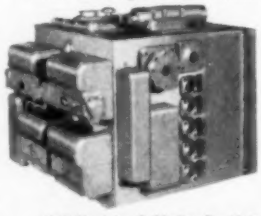
You can obtain the proper hydraulic functions for your machine from either a Barnes Self-Contained Hydraulic Unit or a Barnes Panel Unit. The Self-Contained Unit is furnished complete ready for easy installation while the Panel Unit is similar except that provision must be made in machine for oil reservoir and motor mounting.



Panel Unit complete except for tank which is integral with machine

FREE DATA!

40 page booklet contains detail descriptions of Barnes Hydraulic elements and typical installation circuits. Write for your copy today. Ask for Bulletin T.E. 743.



Self-Contained Hydraulic Unit Complete with Pumps, Valves and Tank

John S. Barnes Corporation

DETROIT SALES OFFICE
503 NEW CENTER BLDG.
TR-1-1706

MAIN OFFICE AND FACTORY
ROCKFORD, ILL.

Are you up against these 3 TAPPING problems?

- Inability to get skilled operators
- Need to employ women on tapping
- Unable to get additional machines

Here's your answer to all three . . .

Ettco-Emrick TAPPING ATTACHMENTS

And here are the reasons why unskilled operators can give you fast, accurate tapping production with these attachments, right on your present drill presses.

1. The **sensitivity** needed in tapping, particularly with the smaller size taps, is provided by the exclusive design of the Ettco-Emrick friction-clutch. It's as sensitive as a hair trigger and lets go the instant the tap sticks or bottoms.
2. Reverse is automatic.
3. The tappers are designed and built for high-speed operation.
4. The tap idles in the cutting direction. This prevents chamfering the hole and doubles cutting edge life.
5. Attachments can be used on any drill press and QUILL CLAMPS are available to assure absolute rigidity.

ETTCO-EMRICK TAP CHUCKS

Grip is visible, assuring proper insertion of taps every time. 5 sizes, for No. 0 to 1" taps. Details in Bulletin No. 6.
Collet type chucks available for No. 6 to 3/8" taps.

BULLETIN NO. 2 GIVES FULL DETAILS

A copy will be mailed to you on request.

ETTCO TOOL CO.

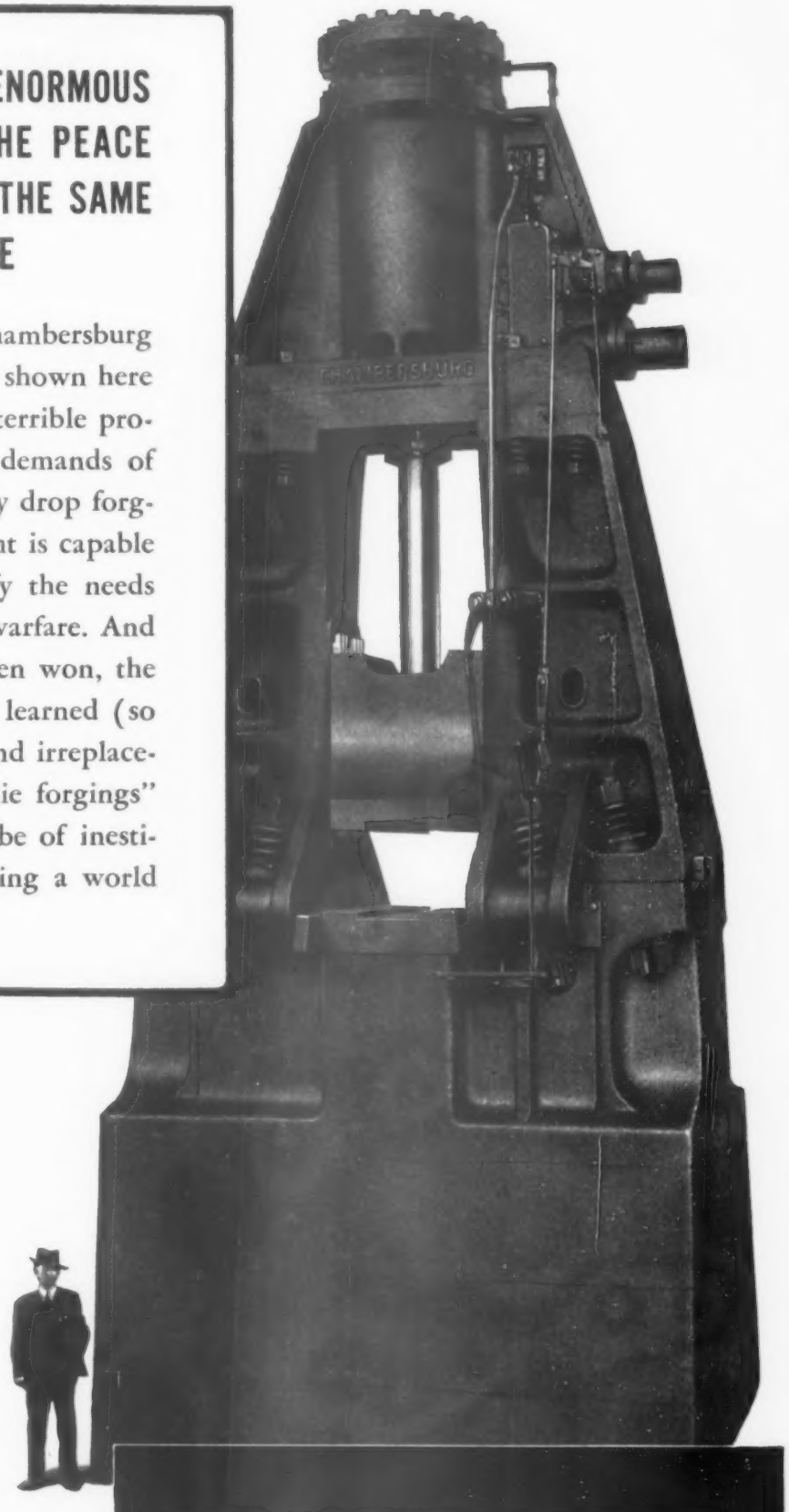
586 Johnson Ave., Brooklyn 6, N. Y.

Detroit ● Chicago

The Famous Ettco-Emrick DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

THIS IS A WAR OF ENORMOUS PROPORTIONS....THE PEACE MUST BE BUILT ON THE SAME TREMENDOUS SCALE

The size of the huge Chambersburg Steam Drop Hammer shown here is an indication of the terrible proportions to which the demands of War have attained. Only drop forgings of the size this giant is capable of producing can satisfy the needs of today's mechanized warfare. And when the Peace has been won, the lessons that have been learned (so slowly) of the unique and irreplaceable value of "impact die forgings" — drop forgings — will be of inestimable value in rebuilding a world of freed men.

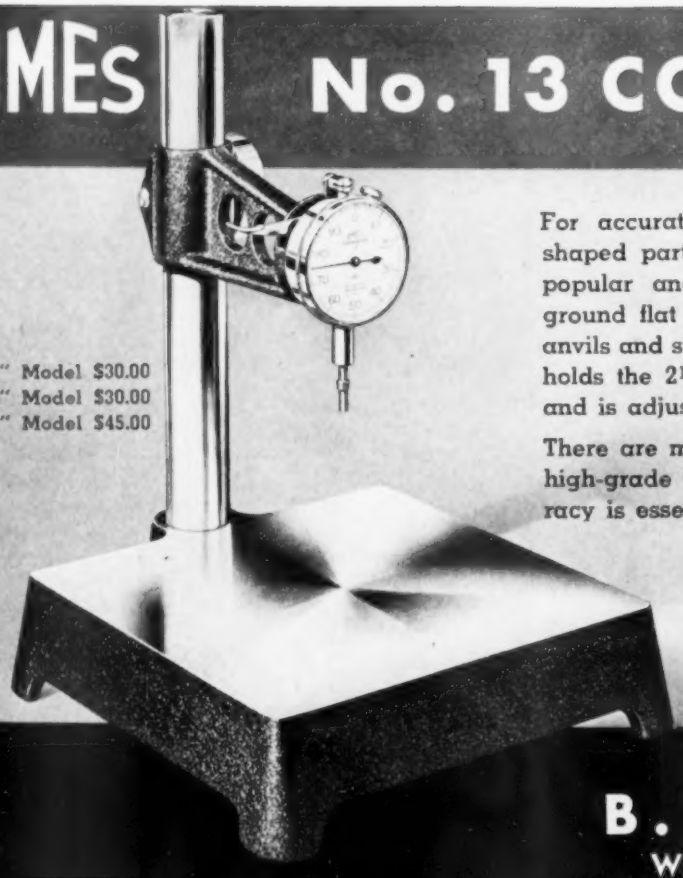


A 35,000 lb. Chambersburg Model E Steam Drop Hammer

CHAMBERSBURG
ENGINEERING COMPANY
CHAMBERSBURG • • • PENNA.

CHAMBERSBURG
HAMMERS · CECOSTAMPS · PRESSES

AMES No. 13 COMPARATOR



.001" Model $30.00
.0005" Model $30.00
.0001" Model $45.00

For accurately measuring large, small and odd shaped parts speedily, this No. 13 Comparator is popular and attractive. The 8" square base is ground flat on top and often fitted with V blocks, anvils and stops of various kinds. The bracket which holds the 2¼" indicator extends 4" over the base and is adjustable for measuring up to 6".

There are many uses for this inexpensive, durable, high-grade Comparator in every shop where accuracy is essential.

SEND FOR CATALOG

B. C. AMES CO.
WALTHAM, MASS., U. S. A.

★ ★ ★ ★

Hobs • Milling Cutters • Slitting Saws
Reamers • Circular and Flat Form Tools

NATIONAL Tools CLEVELAND

Gear Shaper Cutters • Gear Cutters
Counterbores • Broaches • Special Tools

Definition of Precision

Precision - Noun. Exactness, accuracy.

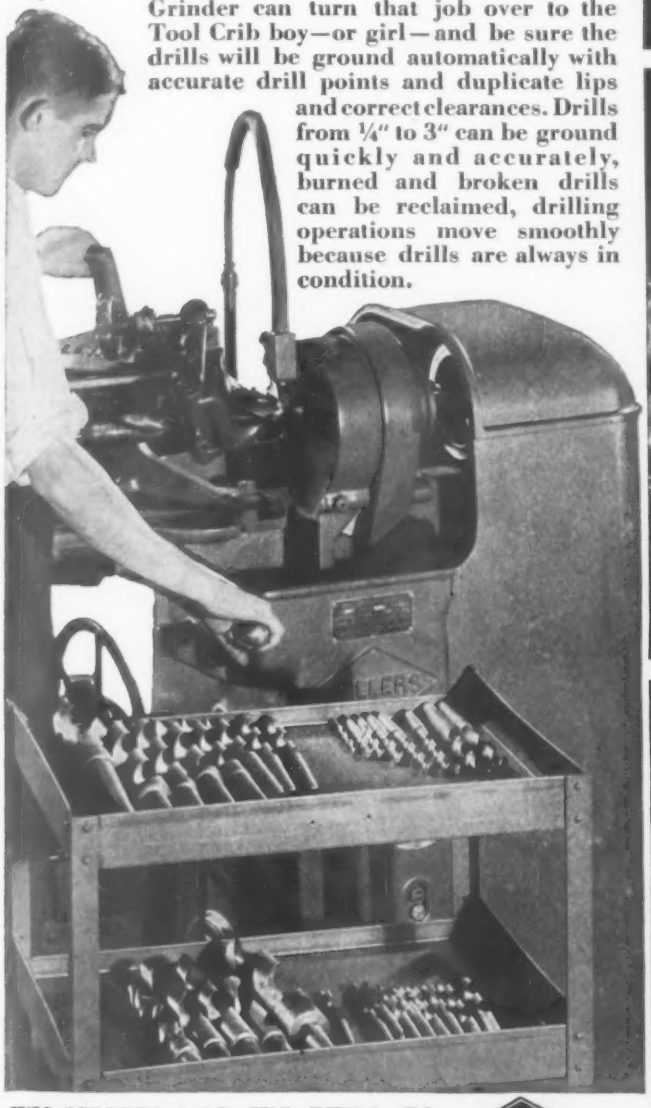
Example - National Cleveland Tools are made with the exactness that enables them to meet the demands of accuracy.

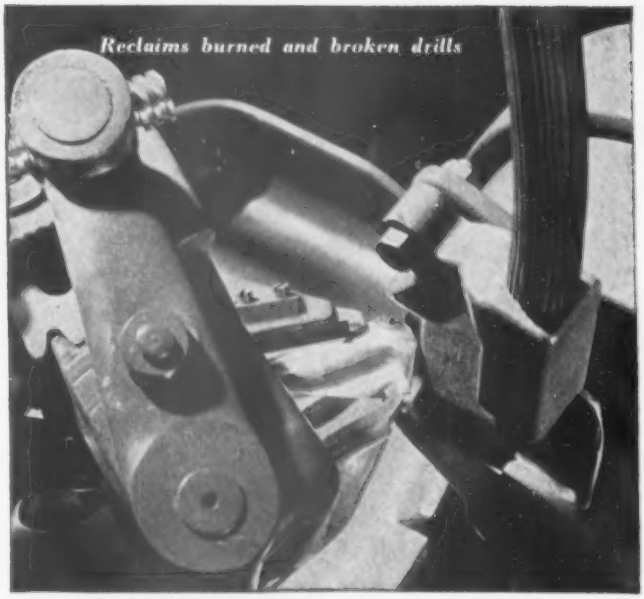
NATIONAL TOOLS HAVE AN INTERNATIONAL REPUTATION

The NATIONAL TOOL Co.
11200 MADISON AVENUE . CLEVELAND, OHIO

The SELLERS Model 6-G Drill Grinder is Ideally Suited to Present Day Operating Conditions

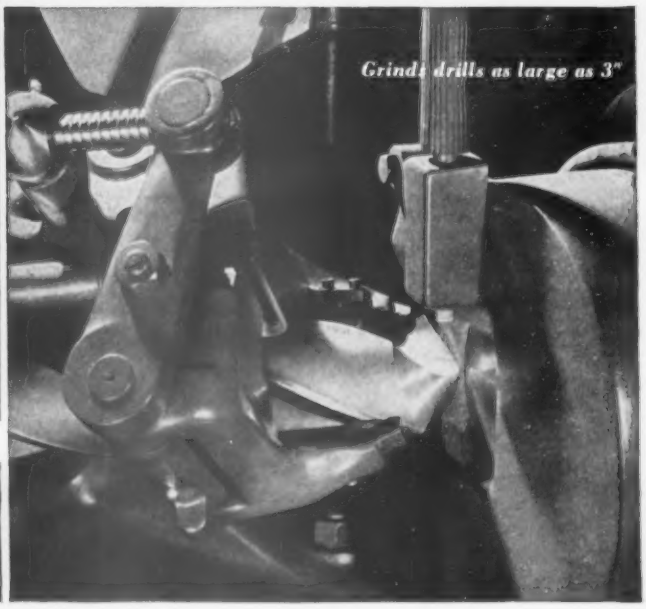
AUTOMATIC!—that is one feature that makes the Sellers Drill Grinder invaluable today. With inexperienced, newly-trained operators, drill grinding can no longer depend on the skill of the old-time machinist who prided himself on his ability to grind tools. The machinist is busy on more important work. So the shop with the Sellers 6-G Drill Grinder can turn that job over to the Tool Crib boy—or girl—and be sure the drills will be ground automatically with accurate drill points and duplicate lips and correct clearances. Drills from ¼" to 3" can be ground quickly and accurately, burned and broken drills can be reclaimed, drilling operations move smoothly because drills are always in condition.





Reclaims burned and broken drills

Grinds drills as small as ¼"



Grinds drills as large as 3"

WM. SELLERS & CO., INC., PHILA., PA.

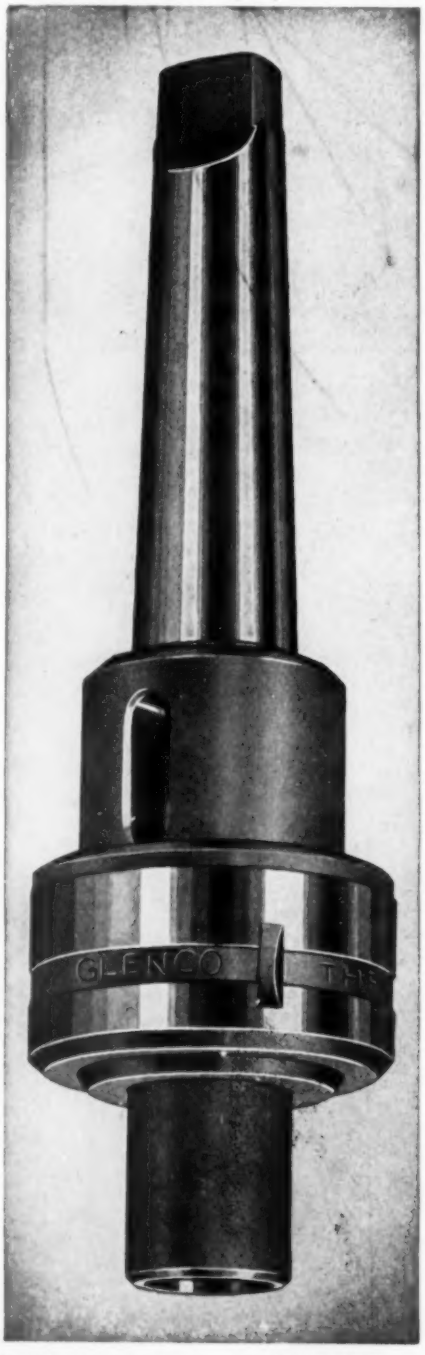
FOUNDED SELLERS 1848

Sellers

GLENCO

FLOATING TOOLHOLDER

Corrects Machine Tool Misalignment By Producing TRUE and ACCURATE Holes



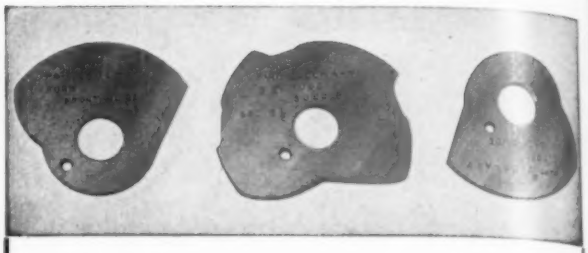
Also Manufacturers of

Wallbillay Tools

FLOATING HOLDERS
SPOTFACERS
COUNTERSINKS
REAMERS
COUNTERBORERS
LIVE CENTERS
SLEEVES
TAP CHUCKS
DRILL CHUCKS
ADJUSTABLE ADAPTERS
ADJUSTABLE EXTENSION ASSEMBLIES
QUICK CHANGE CHUCKS
EXTENSION SOCKETS
SPACING COLLARS
ARBORS
END MILLS
WOODRUFF CUTTERS
CORE DRILLS

THE J. C. GLENZER CO.

DETROIT MICHIGAN



SCREW MACHINE CAMS for B & S MACHINES

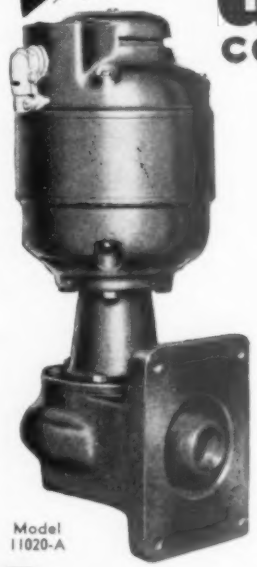
Cams cut to your layout shipped within 2 to 3 days.

Set of 3 No. 00 Cams including blanks, cutting, heat treating — $6.20 complete. Other sizes in proportion.

GEORGE L. DETTERBECK CO.
1871 CLYBOURN AVENUE
CHICAGO, ILL.

For HIGH-SPEED Production

GUSHER COOLANT PUMPS



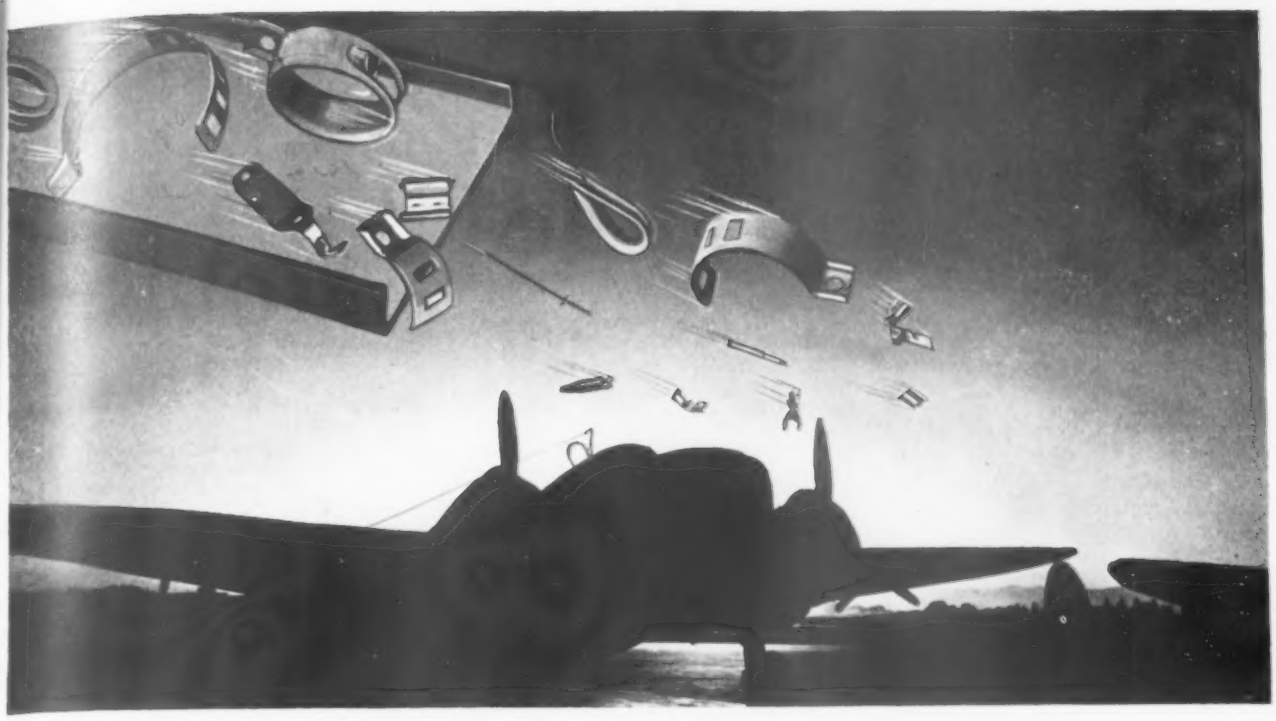
Model 11020-A

Full ball bearing design minimizes friction . . . no pump priming . . . not injured by small chips and grit . . . split-second control, these and other features of Gusher Coolant Pumps help you meet your high speed production schedules.

There's a "Gusher" to meet your needs. Types and sizes from 1/10 to 2 h.p.

Write for data and specifications

THE RUTHMAN MACHINERY CO.
1815 READING ROAD CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS



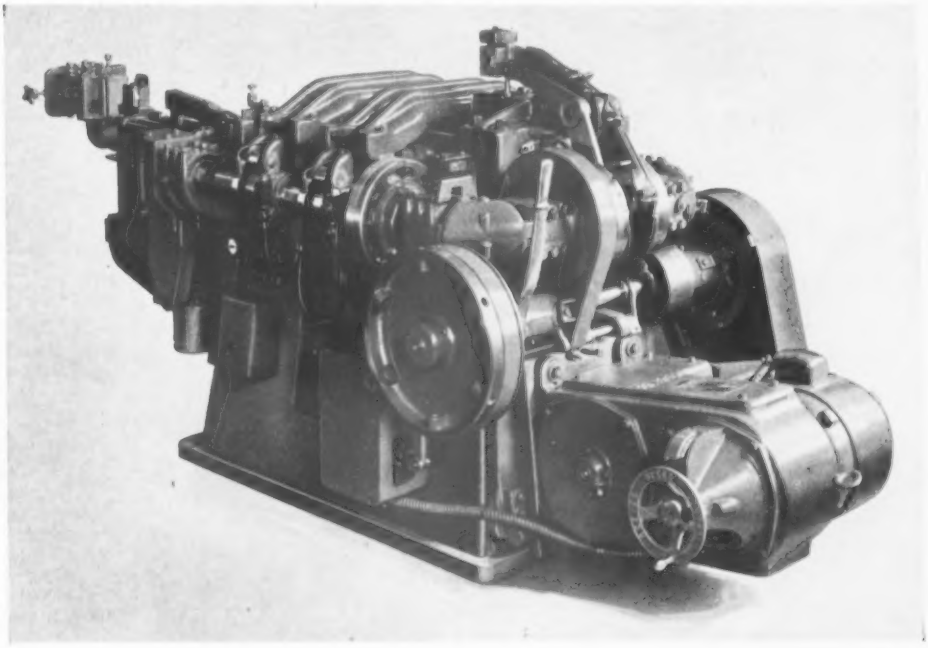
U. S. MULTI SLIDE FOR THE *fast* PRODUCTION OF AIRCRAFT STAMPINGS

Embodied in the construction of modern aircraft are thousands of different parts, including a great variety of formed metal stampings for structural elements. Illustrated above are different types of Aircraft parts fabricated on a high production basis on U.S. Multi Slide Machines . . . a number of sizes of Aircraft Thimbles, Hose Clamps, and a variety of parts for Aircraft Radio — all components of every modern 'plane. U.S. Multi Slides are designed for this type of fabrication of intricate metal stampings from coil stock, generally using the exact width of material and eliminating trimming the edges. The parts are produced complete in the machine without handling; operations such as blanking, piercing, swaging, forming, and embossing are performed. One operator generally attends to a battery of Multi Slides inasmuch as he is required only to start the new coils of material into the machine. Bulletin No. 15-T gives the specifications for the various sizes of U.S. Multi Slides. Your inquiries are invited.

★

(Right:) No. 33 U. S. Multi Slide Machine, equipped with two Die Heads and Reeves Variable Speed Drive Unit.

★



U. S. TOOL COMPANY, INC.

AMPERE (East Orange), NEW JERSEY

NEW EQUIPMENT

T. M. REG. U. S. PAT. OFF.

• Materials + Processing •

ARMOR PLATE GRINDER (K87)

The new GRC type armor plate grinder, recently announced by Vonnegut Moulder Corporation of Indianapolis, is available with a 10 inch diameter segmental abrasive chuck driven by a 7½ hp 1800 rpm motor or a 14 inch chuck driven by a 10 hp motor at 1200 rpm.

This grinding unit has a 90 degree angular adjustment, 45 degrees both below and above horizontal, with vertical and horizontal adjustment to compensate for angular setting. The angularity is indicated on a quadrant scale and each of the three adjustments is made with its respective hand-operated screw.

The frame of the grinding unit is supported upon four grooved wheels which roll upon a pair of round steel tracks. The grinding unit is drawn back and forth along the track by a power feed reversing cable drive. Three standard rates of feed are 4, 6½ and 8 feet per minute. Three alternate rates of feed may be specified.

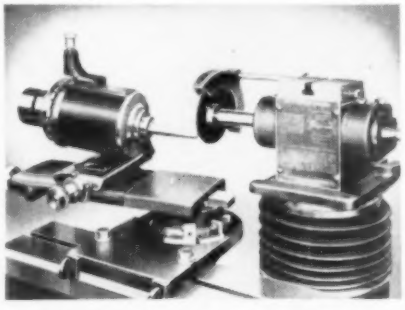
The manufacturer states that this machine was developed as a quick solution to the problem of grinding straightline, square and beveled ends and edges of certain hardened armor plate patterns.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

RADIUS GRINDING ATTACHMENT (K88)

It is said that a wide range of cutters may be ground on the new radius grinding attachment recently announced by The Cincinnati Milling Machine Co. Designed especially for this concern's No. 2 Cutter and Tool Grinder,



Cincinnati Grinder Attachment

it is said to greatly facilitate the grinding of ball-end cutters and die sinking cutters. And, through the use of accessory equipment, other types of work may be handled, such as double-end cutters (straight or helical flutes) and cylindrical grinding of die-sinking tracer fingers.

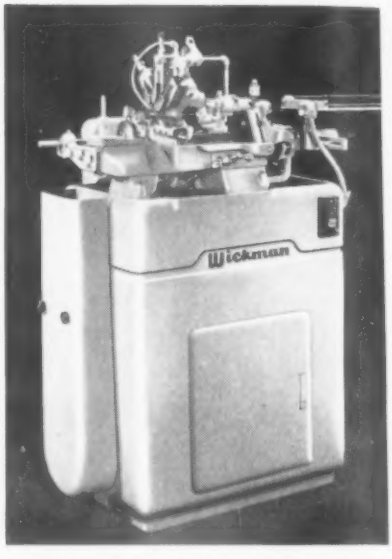
Each of the two slides on this attachment have longitudinal and transverse adjustment of the work with respect to the grinding wheel.

Located at the rear of the work-head spindle, the index plate has 24 notches. With this device, the attachment is said to handle straight flute cutters having 1, 2, 3, 4, 6, 8, 12 and 24 flutes, without the necessity of a tooth rest.

This new machine attachment has been designated as the No. 1 Size by the company so that one will not confuse it with a similar attachment for face mills.

SWISS-TYPE AUTOMATIC (K89)

The new Swiss-type automatic announced by the Wickman Corporation, 15533 Woodrow Wilson Avenue, Detroit, is said to have been designed for the manufacture of extremely small, slender parts. Firing pins, fuse parts,



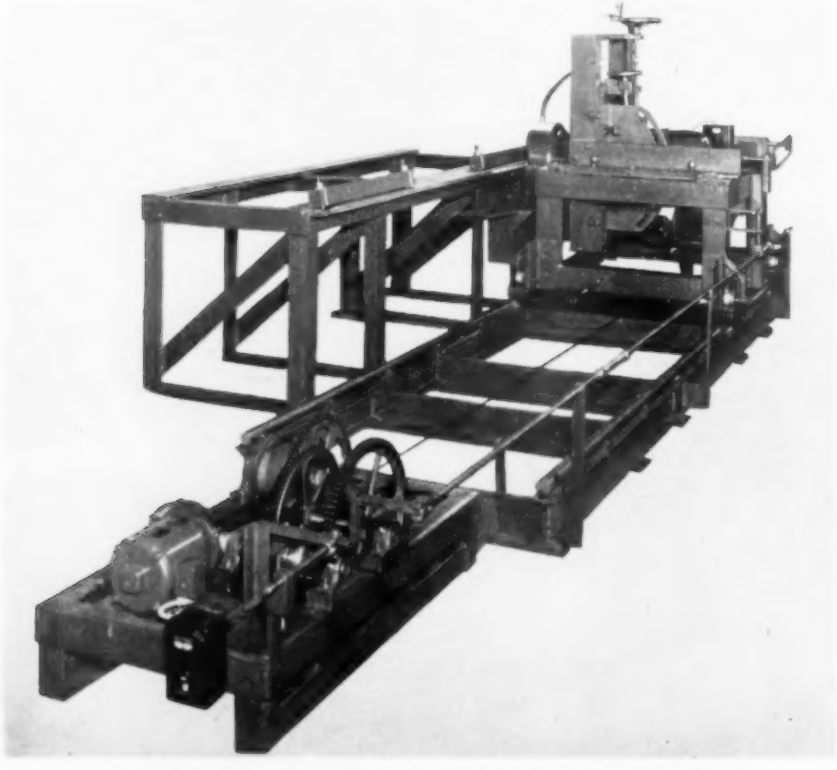
Wickman Swiss Type Automatic

click, watch, meter and aircraft instrument components and other long slender pieces, which are impractical to manufacture with cross forming tools, according to the manufacturer, can be handled by this new machine.

Called the No. 1 High Speed-Type Precision Automatic, it has a bar capacity of 5/32 inch diameter, a maximum turning length of 1-9/16 inches, a range of spindle speeds from 1500 to 12000 rpm and machine cycles from 2 seconds to 5 minutes.

The manufacturer states that the machine is designed with sufficient rigidity and high enough spindle speeds to take full advantage of tungsten carbide cutting tools. It is also stated that secondary operations are seldom necessary and that small precision parts, normally considered impossible to manufacture in one operation to limits of

(Continued on page 166)



Vonnegut Armor Plate Grinder For Hard-to-Handle Patterns

FREE INFORMATION and SERVICE

Request the information and service you desire and keep your library up-to-date . . .

Copyright 1943 by The Bramson Publishing Co.

THREE FREE SERVICES without obligation

For your convenience these three business reply cards enable you to request quickly

1: New catalogs — bulletins listed in this issue.

2: Additional information or bulletins relative to new equipment — new materials or new processes.

3: When answering advertisements, specific information on problems or company representative's call.

HOW TO ORDER

Simply fill out the card, indicating the information or service you desire, and mail.

Be sure to write, in the square, the identifying number of the catalogs or bulletins covering new products described.

In answering an advertisement, include the name of the advertiser and indicate by a cross if literature is desired or if company representative should call. No stamp is required.

USE THIS CARD

for requesting new catalogs and bulletins listed in this issue.

USE THIS CARD

for requesting additional information or bulletins about new equipment, materials, processes, etc.

USE THIS CARD

when answering advertisements, to obtain specific information on problems, or when you desire a company representative to call

---

Write in square, number of item describing one catalog wanted ▶ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

Write in square, number of item describing one catalog wanted ▶ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

Write in square, number of item describing one catalog wanted ▶ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

Write in square, number of item describing one catalog wanted ▶ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

Write in square, number of item describing one catalog wanted ▶ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

Write in square, number of item describing one catalog wanted ▶ ☐

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

THE TOOL ENGINEER, JULY 1943

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

PAGE NO.

NAME OF ADVERTISER

☐ Literature ☐ Have Representative Call

NAME

COMPANY

ADDRESS

TITLE

USE THESE FREE REPLY CARDS

They are provided for your convenience in requesting information and service . . . . .

FIRST CLASS
PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

THE TOOL ENGINEER
THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BLVD.
DETROIT 2, MICHIGAN

1

Request for:
NEW CATALOGS
BULLETINS
BOOKLETS

FIRST CLASS
PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

THE TOOL ENGINEER
THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BLVD.
DETROIT 2, MICHIGAN

2

Request for additional information and catalogs covering
NEW EQUIPMENT
MATERIALS
PROCESSES

FIRST CLASS
PERMIT No. 6691
(Sec. 510, P. L. & R.)
DETROIT, MICH.

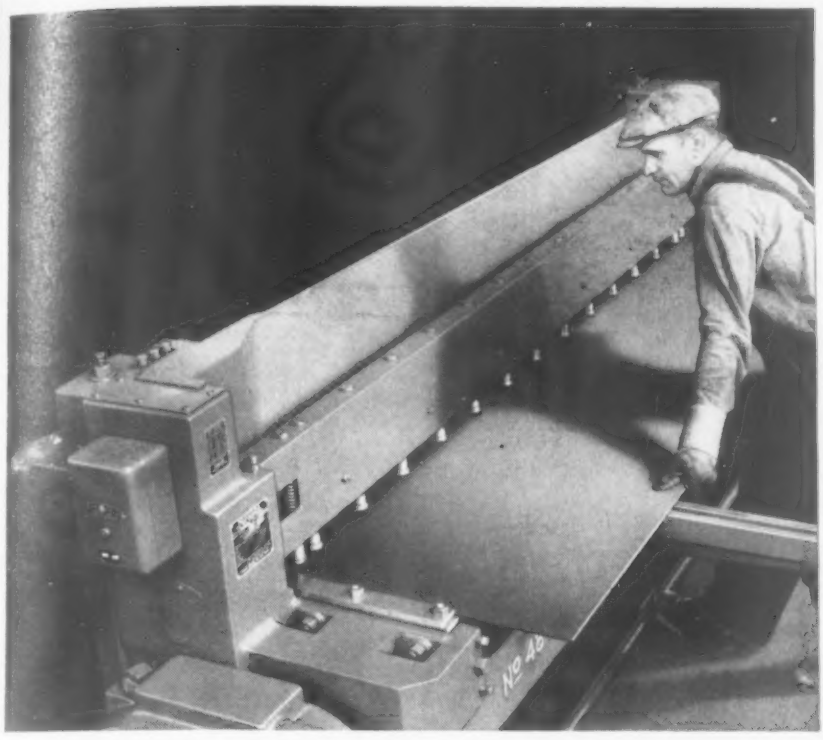
BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

2c.-POSTAGE WILL BE PAID BY—

THE TOOL ENGINEER
THE BRAMSON PUBLISHING COMPANY
2842 W. GRAND BLVD.
DETROIT 2, MICHIGAN

3

ANSWERING ADVERTISEMENTS
Requesting:
LITERATURE
REPRESENTATIVE TO CALL



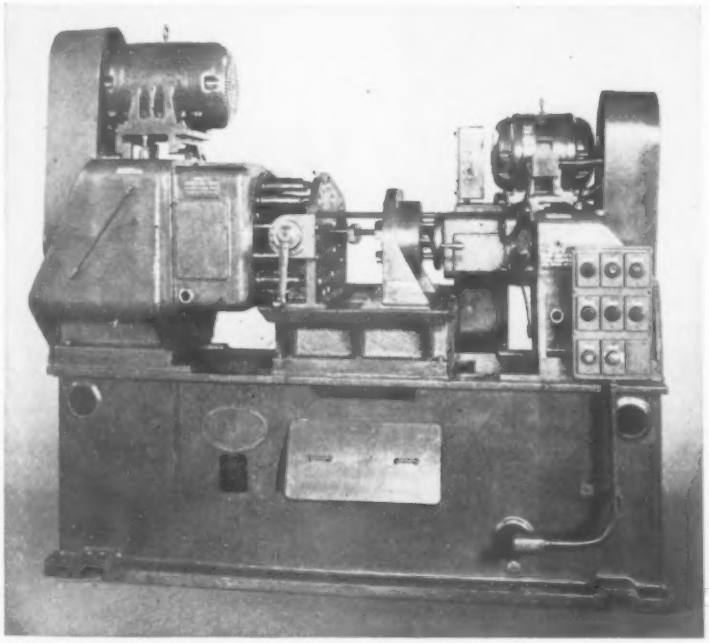
War plants throughout America are obtaining more production per man hour wherever sheet metal must be squared, trimmed or cut into strips. The above photograph gives an "operator's eye-view" of one of the latest type Niagara Power Squaring Shears. The entire machine is arranged for convenient operation, quick, accurate setting of ball bearing, self-measuring, parallel back gauge, full visibility of cutting line and many other features which speed up shearing. Niagara Power Squaring Machines are built in a complete range of sizes and capacities.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

NIAGARA MACHINE & TOOL WORKS
BUFFALO, N. Y.
District offices: Detroit, Cleveland, New York

Let **Buhr** PATENT

MULTIPLE SPINDLE
DRILL and TAP HEADS



put your idle machines on the production line

A base and motors brought out of storage and retooled with a holding fixture;

A 19-Spindle Tapping Head on Left Side and an 8-Spindle Tapping Head on Right Side.

All spindles are provided with vertical adjustment to secure proper tap depth, and each head has an oil pump for positive lubrication and freedom from wear.

BUHR MACHINE TOOL COMPANY, ANN ARBOR, MICH.
Specialists in Multiple Spindle Drilling, Boring, Reaming, Tapping Equipment

+ or —.0002 inch on diameter and concentricity.

The principle employed in this machine is that of feeding the stock through a guide bushing past radially fed tools. Both the headstock carrying the bar stock and the tools performing the cutting operations are controlled by cams.

The cam-controlled, individual tool slides are of hardened steel construction and have micrometer adjustment both radially and parallel to the axis of the work.

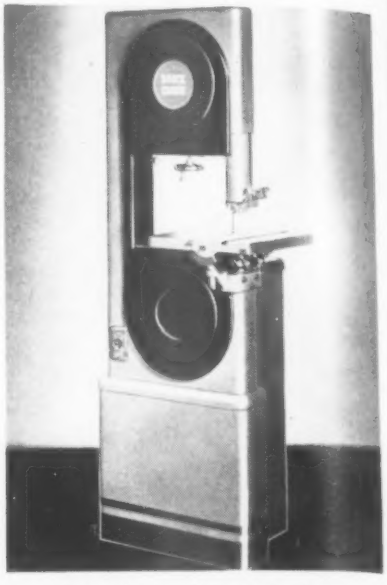
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

METAL-CUTTING BAND SAW (K90)

The new band saw for cutting metals, wood, plastic and paper, recently introduced by Boice-Crane Company, 934 Central Avenue, Toledo, Ohio, is said to cut stock 8⅝ inches thick and handle work 27 inches in diameter. The saw has a blade tension scale.

The entire framework is a single one-piece structure and the manufacturer states that operation is quiet and vibrationless. Handling blades from ⅜ to ¾ inch, this new saw has a wheel guard



Boice-Crane Metal Bandsaw

that must be closed before the machine can be operated.

The table measures 15 by 15½ inches and tilts 45 degrees to the right and 10 degrees to the left. A scale which indicates the degree of tilt is provided. The machine has eight speeds.

All mechanisms on the floor models are said to be fully enclosed and sealed against dust and grime. This saw is also available in bench models.

FACE-MILLING CUTTERS (K91)

Said to be designed to cut steel and non-ferrous metals at greatly increased feed rates, the new development in face-milling cutters, recently announced by The Ingersoll Milling Machine Company of Rockford, Illinois, is called Ingersoll Shear Clear. The manufacturer states that blades are set in the housing at steep negative rake and positive shear angles.

Ingersoll Face-Milling Cutters

The beveled corner of the blade is the cutting edge. In operation, the blade is said to strike the work-piece at a point

(Continued on page 168)

Try Sutton Full-Floating Style "F" COLLETS with interchangeable, replaceable jaws—each jaw floats independently, comes to full bearing on stock—allows collet to run as true as the machine spindle. One master per machine with an assortment of jaws will handle your work, round, hex and square, up to machine capacity. Jaws are quickly changed without removing master from tube. Patented Diamond Grip takes horizontal and rotating thrusts at an angle—gives full grip with one-third less tension. With Style "F" Collets, use the companion Style "L" Feeders, with interchangeable, replaceable pads.

SUTTON TOOL COMPANY • 2895 W. Grand Blvd. • DETROIT

See our representative or send for Catalog 15

SUTTON Diamond Grip **COLLETS**

This part produced in ONE forming cut by the

OSTER NO. 601

"RAPIDUCTION" TURRET LATHE

The part illustrated is one of numerous examples of heavy forming cuts obtained with the SIMPLIFIED Oster No. 601 "RAPIDUCTION" Turret Lathe, equipped with WORM DRIVE.

The hardened and ground steel worm, like the spindle, is mounted in ball bearings. A smooth, even flow of power is transmitted through a bronze worm wheel to the spindle. This smooth flow of power makes possible exceptionally heavy forming cuts with absence of chatter. (For high speed work on small diameters and non-ferrous materials, a DIRECT DRIVE is provided. Spindle speeds up to 3000 R. P. M. are obtained.)

The 6-station turret is now equipped with AUTOMATIC INDEXING. Price of complete machine is unchanged (Under $2000 without tools, F. O. B. Factory). The form below offers a convenient way to obtain full details QUICKLY. *Use it!*

No Time Out to Celebrate Our 50th ANNIVERSARY 1893-1943

OSTER

THE OSTER MFG. CO., 2063 E. 61st ST., CLEVELAND, OHIO, U. S. A.

★ O.K. Oster. We're interested in the No. 601 machine. ( ) Send Catalog No. 601. ( ) Ask your nearest distributor to see us at once. (Check either or both of above requests.)

NAME .....

ADDRESS .....

CITY ..... STATE .....

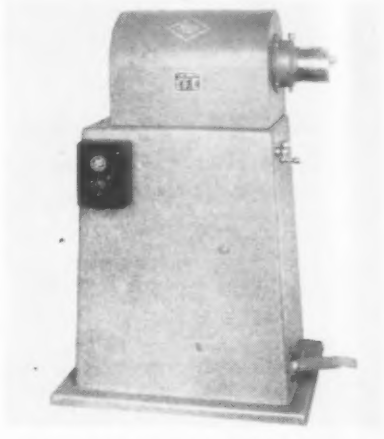
ahead of center on the beveled cutting edge and gradually increases the chip width in a shearing action. Thus, the chips formed coil evenly and continuously outward, according to the manufacturer, and fall away from the cutter at the end of the cutting arc.

It is claimed that this cutting action, which eases the blade into the work and deposits the chips off the cutter path, gives the user the advantage of faster feeds, smoother finishes, longer tool life and less power equipment.

VARIABLE SPEED LATHE *(K92)*

Said to be especially effective on final finishing operations of work that requires burring, filing, polishing and lapping of gages, gears, pinions and pulleys, the new variable speed lathe recently announced by the Schauer Machine Company, 2066 Reading Road, Cincinnati, has a range of speeds from 100 to 4800 rpm. The variable speed is obtained through a Reeves Dri

The machine has an improve twin disc clutch assembly, according the manufacturer, which transmits th pow-



Variable Speed Finishing Lathe

er from a continuously running motor to the spindle when the foot treadle is depressed. When the foot treadle is released, a disc type brake is automatically applied.

Selection of the speeds is obtained through the use of the balcrank handle located on the side of the machine. The variable speed ratio is 6 to 1 for the one speed motor and 12 to 1 for the two speed motor.

The spindle and holding devices are contained in a separate welded steel housing which is mounted on the floor type pedestal. The motor is said to be easily accessible for replacement or removal.

DIAMOND DRESSING TOOL *(K93)*

A new diamond dressing tool that is said to fit most standard grinding machines was recently announced by The Koebel Diamond Tool Company of

Adaptable Diamond Dressing Tool

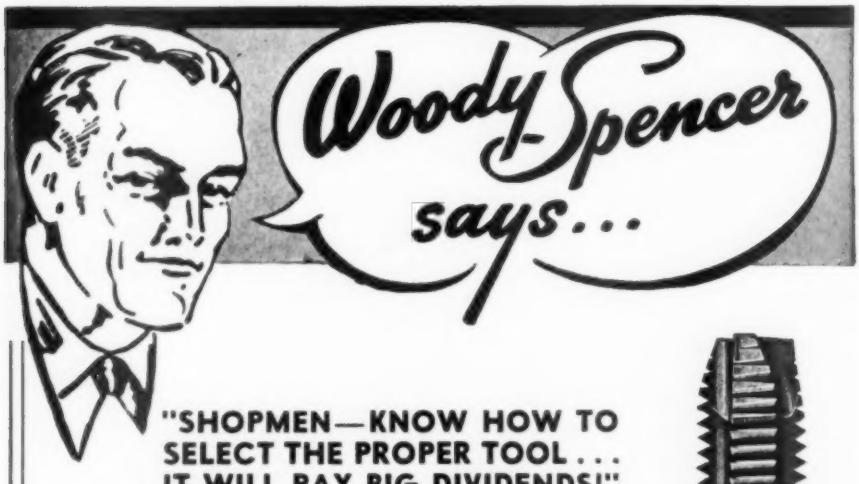
Detroit. It is known by the trade name of "Kodi" and, according to the manufacturer, does away with the necessity of a special dresser for each machine.

The special shank, or Ko-Adapter, is fitted with a recessed head set screw

(Continued on page 170)

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.



"SHOPMEN—KNOW HOW TO SELECT THE PROPER TOOL . . . IT WILL PAY BIG DIVIDENDS!"

(No. 1 in a series of WOOD & SPENCER "KNOW HOW" messages)

Choose the right tool. The wrong tool can easily spoil a job . . . result in loss of time, material and labor. To aid you in avoiding these losses WOOD & SPENCER offers this first in a series of "know how" messages.

1. A tap ground specially for tapping steel will not do good work in brass. Therefore, choose the tap best suited to the job.
2. Taps do not cut the same size in different metals, or at different speeds in the same metal.
3. Taps measuring exactly the same size will not cut the same size if the rake of the cutting edge is different.
4. Changes in kinds of lubrication will affect results.
5. Keep taps sharp. Dull taps bind and break. Frequent sharpening will prolong life of tap.

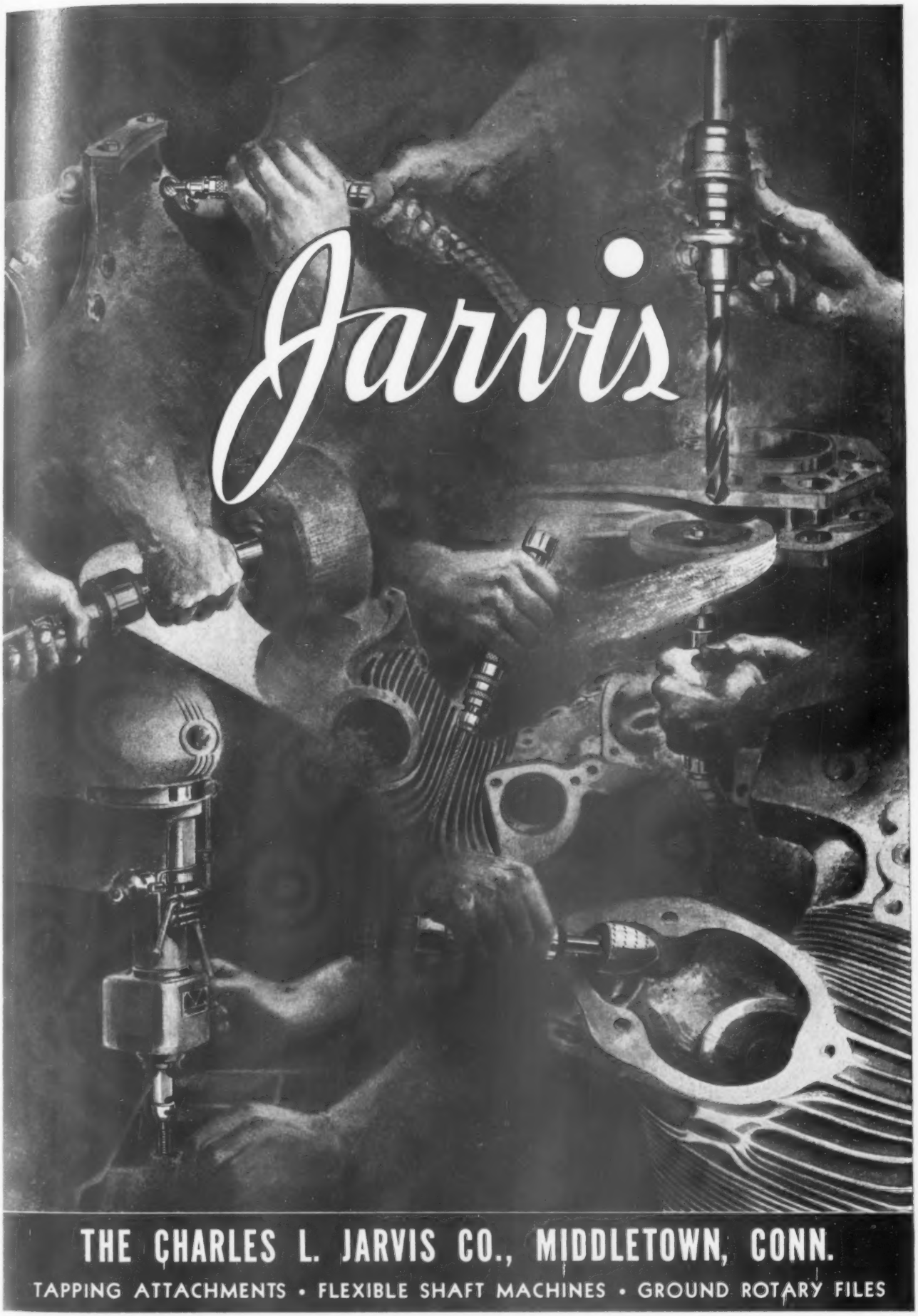
Apply these rules to your every day work. By so doing, you will be able to produce quality work, faster, and with less waste . . . thus contributing greatly to Our Country's War Effort. Watch for future WOOD & SPENCER messages. Write for helpful information.

From customers blueprints we quite frequently make recommendations for

"THE RIGHT TAP AT THE RIGHT TIME"

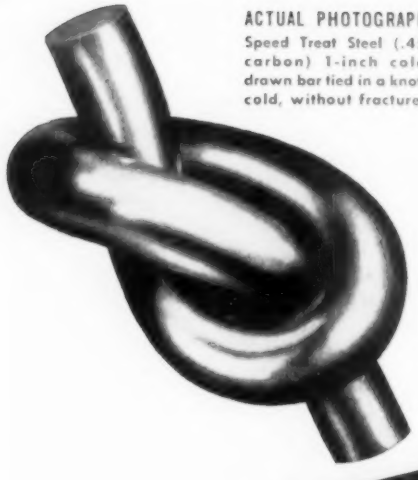
The Wood & Spencer Company

Cleveland, Ohio



THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES



ACTUAL PHOTOGRAPH
Speed Treat Steel (.45 carbon) 1-inch cold drawn bar tied in a knot, cold, without fracture.

SPEED TREAT STEEL

A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

ONE *Steel that gives you . . .*

1. Excellent *machinability*
2. Greatly extended *tool life*
3. Good *finished* parts
4. High *physical* properties
5. Excellent *impact* resistance
6. Good *torsional* values
7. Minimum *distortion*
8. Fine heat *treatability*

BUY WAR BONDS

"SPEED TREAT" STEEL offers an unusual *combination* of features never before found in ONE steel in the medium carbon, open hearth field. The eight features above make it an excellent substitute for ALL medium carbon, carbon steels.

★ WRITE US FOR DETAILS . . . *Our metallurgists are at your service*

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

which locks the standard Kodi nib in position. It is claimed, that once installed, the Ko-Adapter remains in the machine and only the nib is removed for resetting or replacement.

An additional feature of the tool is the sequence of graduations to guide the operator. It is also stated that one Kodi nib fits all Ko-Adapters.

ROUND LAPPING PLATE (K94)

An 18 inch round lapping plate is now being manufactured by The Challenge

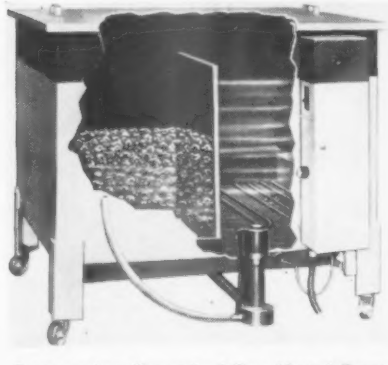
Challenge Round Lapping Plate

Machinery Company of Grand Haven, Michigan. Said to be precision ground of semi-steel, this plate is 4 inches deep and is equipped with two handles to facilitate handling.

The surface is grooved in two directions, one set of lines running at a 90 degree angle to the other set. The manufacturer states that larger sizes with either precision ground or hand scraped surface finishes are available on special order.

NEW UNIT FOR DEGREASING (K95)

A degreasing unit which includes a pre-dip wash and vapor rinse and dry is the newest addition to a line of degreasing equipment manufactured by the Phillips Manufacturing Company



Degreasing 'Laundry' For Metal Parts

of 3485 Touhy Avenue, Chicago.

This portable, double-dip machine is said to have been devised for use in degreasing small metal parts which cannot be taken care of by the conventional vapor degreaser due to the light gauge of the metal being used.

The pre-dip wash consists of a kero-

(Continued on page 172)

For Precision and Versatility

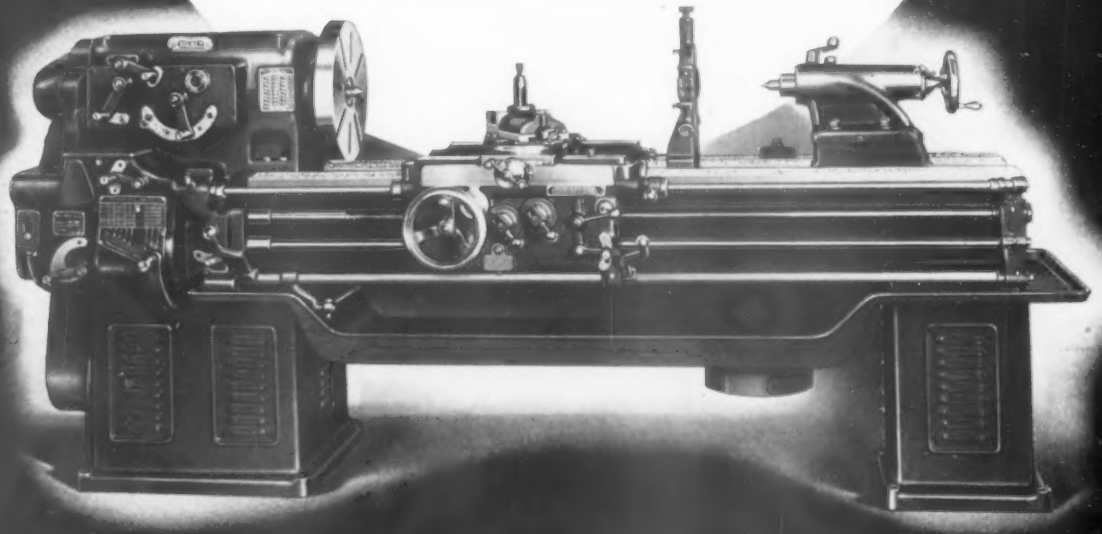
SIDNEY TOOL ROOM LATHES

● The wide range of work—the extreme tolerances demanded—the fine finish required in tool room operation finds hundreds of shops using Sidney Tool Room Lathes for this exacting work.

Sidney Tool Room Lathes are built in four sizes—from 14″ to 20″ inclusive. They have 16 speed continuous tooth Herringbone geared headstocks—48 feed changes from .0027″ to .172″—48 thread changes 1½ to 92—forced feed lubrication—anti-friction bearings throughout, all of which contributes to their wide range adaptability and long lived accuracy.

Built to rigid standards of Precision Accuracy.

Bulletins available.



The **SIDNEY MACHINE TOOL** *Company*

Builders of Precision Machinery

SIDNEY ESTABLISHED 1904 **OHIO**

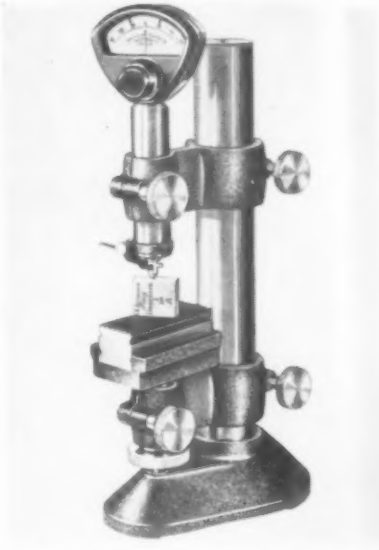
sene-solvent solution to which is added a very potent wetting agent which wets down the oils, greases and waxes on the parts. This will permit the kerosene-solvent solution to thoroughly flush them off the parts.

INSPECTION GAGE (K96)

This gage is called the "Mikrokator" and is manufactured by the Swedish Gage Company of America, 8900 Alpine Avenue, Detroit. According to the manufacturer, the mechanism has no friction bearings, racks, pinions, gears, levers or other moving parts subject to wear.

Due to the light weight and absence of inertia in the moving parts, the pointer is said to respond instantly to the slightest movement of the measuring tip and does not swing past the true reading. Thus, it is claimed that there is no waiting for the pointer to come to rest at the true reading.

No lights, electromagnets or other electrical connections are used with the gage. Amplification is said to be completely mechanical. The gage is constructed with the pointer mounted on a twisted strip of metal. Elongation of the strip causes the strip to unwind and the pointer to rotate. One end of he strip is fastened to an adjustable support while the other end is fastened to the vertical member of a spring knee. The horizontal member of this spring knee is fastened to the upper end of the spindle. The lower end of the spindle is secured to a metal diaphragm. An upward movement of the spindle causes the spring knee to elongate the strip.



"Mikrokator" Inspection Gage

INFORMATION FREE

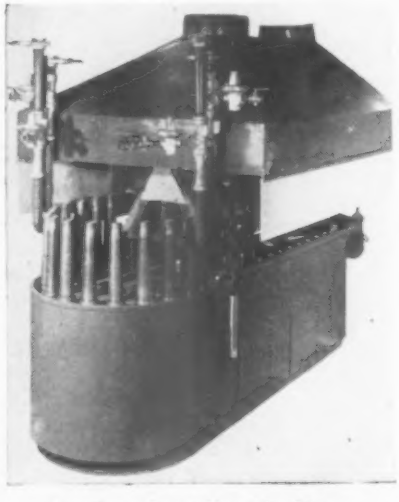
For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

CARTRIDGE CASE ANNEALING MACHINE (K97)

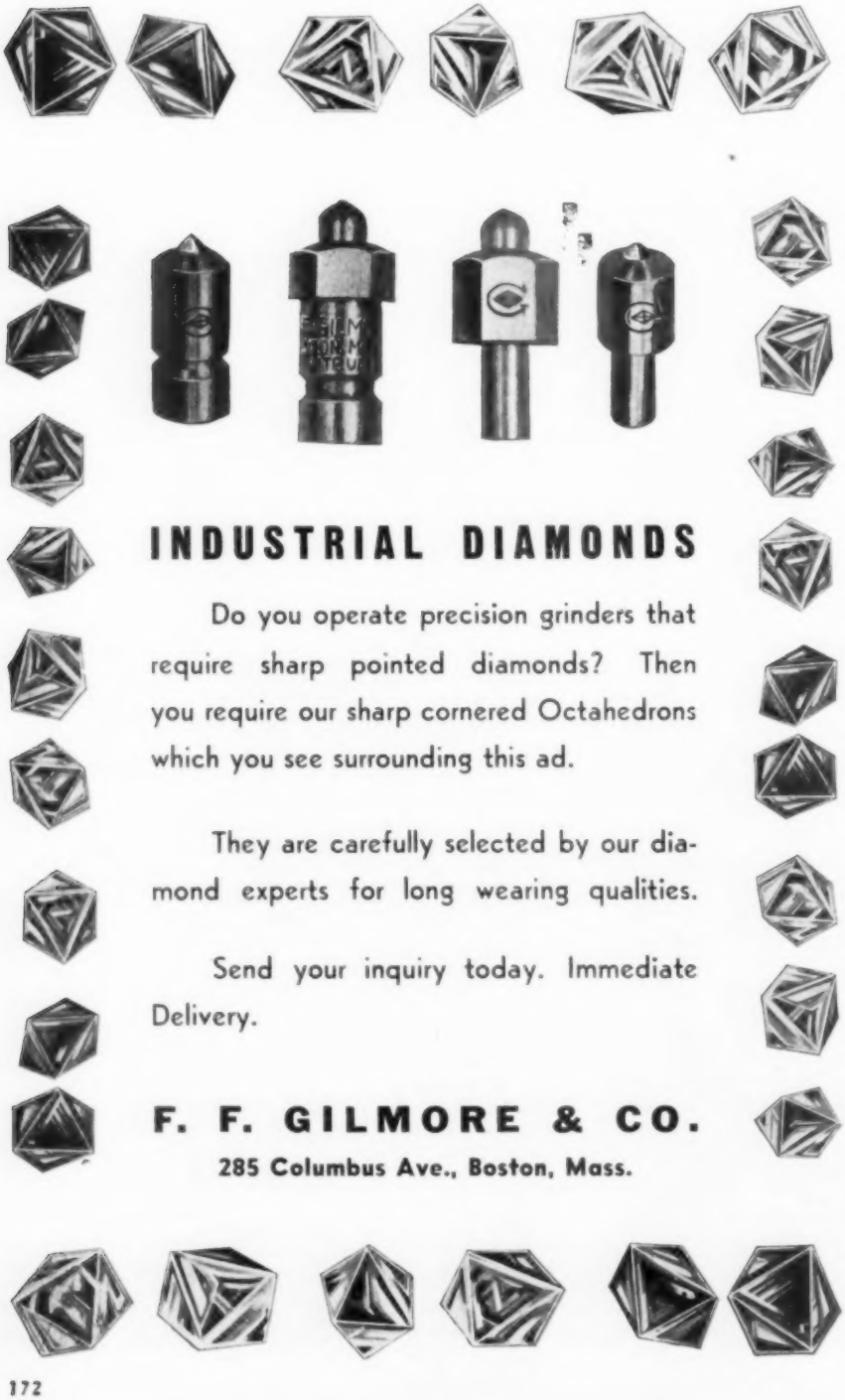
Said to fulfill the need for a machine of the continuous type that would produce a uniform and satisfactory anneal on steel cartridge cases before tapering and the final mouth annealing, this new annealing machine has been developed by Morrison Engineering Company of Cleveland.

In order to cover a large range of

(Continued on page 174)



Morrison Annealing Machine



INDUSTRIAL DIAMONDS

Do you operate precision grinders that require sharp pointed diamonds? Then you require our sharp cornered Octahedrons which you see surrounding this ad.

They are carefully selected by our diamond experts for long wearing qualities.

Send your inquiry today. Immediate Delivery.

F. F. GILMORE & CO.

285 Columbus Ave., Boston, Mass.

LINES BEHIND THE LINES

FROM RANGES, REFRIGERATORS AND RADIOS . . . TO BOMBS, SHELLS AND TORPEDOS . . . THE APPLIANCE INDUSTRY CONVERTS TO WAR!

Skilled as it is in the manufacture of complex small parts assemblies, the appliance industry utilizes, in war as in peace, the most efficient production methods available. Broaching is high on its list as a better way to do many metal-working jobs—the only *right* way to do some!

UPPER RIGHT. Broaching the diagonal slot in this brass fuse part is typical of the production-with-precision work required. Using an American 16" Rotary Machine, with 8-station fixture designed for manual loading, automatic clamping and automatic discharge, extremely high output is obtained.

LOWER LEFT. American broaching engineers designed this fixture to locate and index the part from three holes, with further support by recessing part in toughened steel block to minimize burr. American's *complete* broaching service —machines, tools, and engineering—contributes mightily to winning war production, profitable post-war production.

BROACHING IS BETTER

THE *American* WAY

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES

PRESSES

BROACHING TOOLS

SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS

shell sizes, three models of basically the same machine were designed. Model 3740 will handle 37 mm and 40 mm cases; Model 5710 will handle the 57, 75 and 105 mm cases while Model 390 takes care of the 90 mm and the 3 inch anti-aircraft cases.

INFORMATION FREE

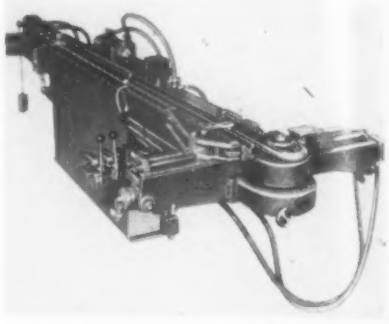
For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

Production is said to vary from 400 to 2,000 cases per hour. The machine has a steel conveyor chain placed on its side and driven by a variable speed drive through a totally enclosed worm gear reducer. This chain carries double row ball bearing mounted spindles every pitch. On top of the rotating spindles, work holder adaptors are bolted and are interchangeable for different size cases.

The burner equipment is of the blast line type with zero governors and proportional mixers provided for each burner. By operating at comparatively high mixture pressures and by rotating the work from 60 to 100 rpm in front of the burners, extremely fast heating is said to be attained.

BENDING MACHINE BOOSTER ATTACHMENT (K98)

The addition of a patented booster attachment to the line of hydraulic bending machines made by Pines Engineering Company of Aurora, Illinois, was recently announced. Said to



Booster For Bending Machine

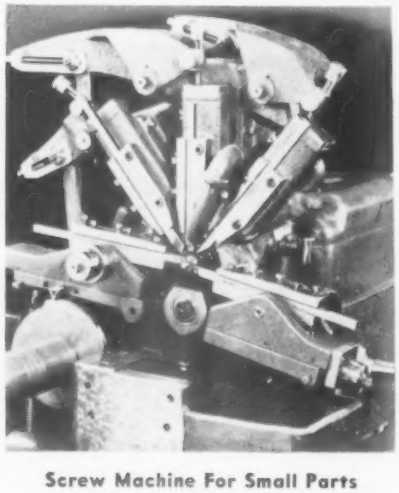
assure shorter radius bends and faster production, the attachment permits operation by women.

This attachment is in the form of a separate cylinder through which the mandrel rod passes. As the tube advances on the mandrel during the bending operation, the booster cylinder applies pressure to the end of the tube and relieves the tension that is ordinarily required to draw the tubing off the mandrel from the already bent portion of the tube.

Another advantage of this attachment is said to be, that by allowing the pressure on the end of the tube to continue after the tube is unclamped in the bending dies, the tube that has been bent is automatically removed from the machine.

AUTOMATIC SCREW MACHINE (K99)

Since the mass production of small, close-tolerance parts plays an important part in war production, the George Gorton Machine Company of Racine,



Screw Machine For Small Parts

Wisconsin has added to its line of machine tools a new 16-A precision automatic screw machine for this type of work.

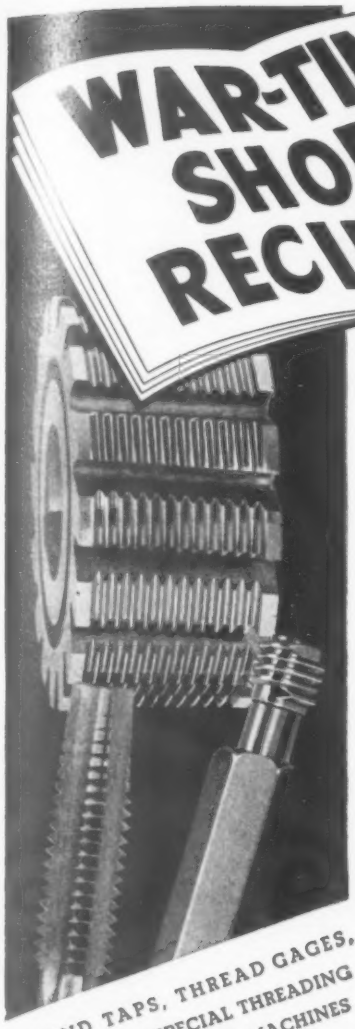
(Continued on page 176)

1. *Tools easily honed—kept highly polished—before each shift or with tool in machine—cuts down on carbide-tool grinding.*
2. *Keeping tools sharp saves set-up time in changing to new tools, speeds machine output and reduces work spoilage.*
3. *Tamaloy Hones are long-lasting. Diamonds set in tungsten carbide resist wear. Carbide matrix prevents diamonds from falling out when rubbed against hard surface or edge.*
4. *Supplied in three grades—rough, medium and fine or 100, 150 and 200 grit.*

Ask for prices and other details

TUNGSTEN ALLOY MFG. CO.

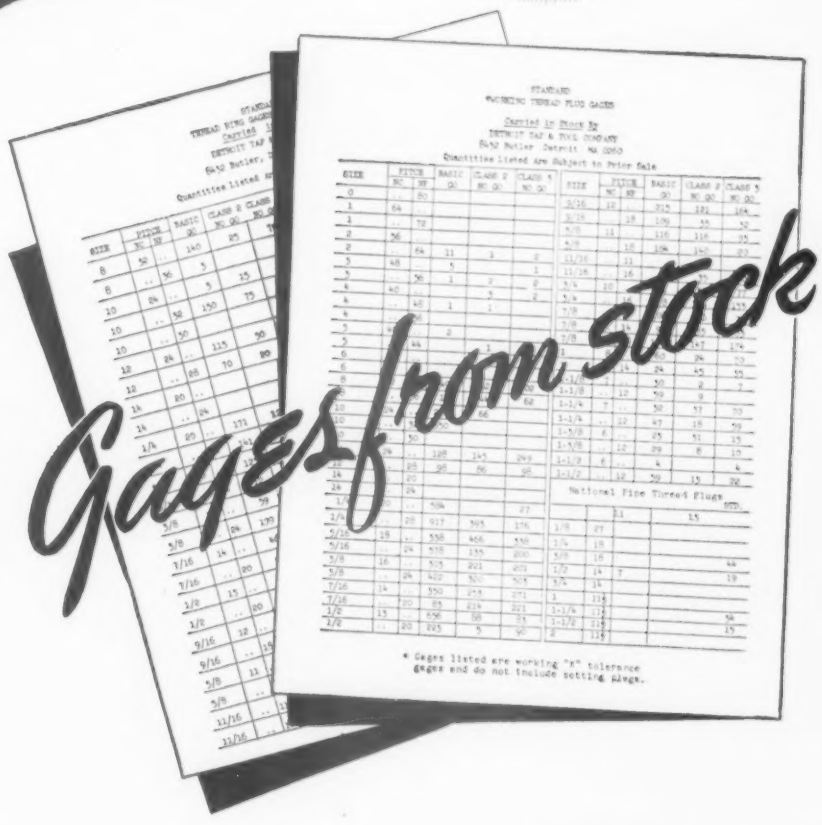
65 COLDEN STREET, NEWARK, N. J. formerly Circle Tip Tool Co.



GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS. SPECIAL TAPPING MACHINES

WAR-TIME SHOP RECIPES

#5 for thread production



Gages from stock

Need some particular thread gages in a hurry? Here's your best bet: *Every two weeks* Detroit Tap issues to its field representatives lists showing sizes and quantities of standard thread gages available from stock in Detroit. Chances are your size may be readily available. It only takes a phone call to find out. Pick the nearest one from those listed below:

CHICAGO	KEdzie 3170	PITTSBURGH	MAyflower 3177
CLEVELAND	HEnderson 6113	ROCKFORD	MAin 2243
DETROIT	MAdison 0260	ST. LOUIS	CEntral 4435
DENVER	KEystone 7229	ST. PAUL	GArfield 4341
FLINT	FLint 4-2624	SYRACUSE	SYracuse 8-1462
HOUSTON	CApitol 5634	TOLEDO	GArfield 8017
INDIANAPOLIS	RIley 9393	IN CANADA	
LOS ANGELES	KImball 9111	MONTREAL	MArquette 5346
MILWAUKEE	DAly 4256	TORONTO	WAverly 2688
NEWARK, N. J.	MArket 3-1492	WINDSOR	WIndsor 4-9229

Perhaps you would like to receive copies of these gage stock lists regularly? Make a phone call today, or write:

DETROIT TAP & TOOL CO.

8432 BUTLER STREET, DETROIT, MICHIGAN, U. S. A.

The Gorton 16-A is an American development of the Swiss Peterman P-7 and, according to the manufacturer, has been modernized and improved for greater automatic screw machine production.

Among the specific parts that this machine is said to be adapted to turning, are pinions, shafts, screws and small slender parts used in clocks, meters, radio equipment, precision instruments, guns and aircraft engines.

This machine handles diameters from .005 to 7/16 inch and lengths from 1/32 to 2¾ inches. The manufacturer also states that, in addition to step and contour turning and chamfering, the machine, with attachments, automatically performs centering, drilling, threading and slotting operations.

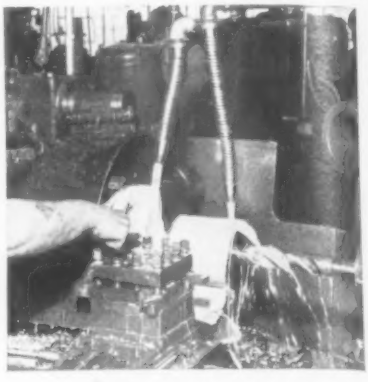
In operation, the stock is fed to the 5-station multiple tool head by means of a cam, through a bushing and past the cutting tools which are stationary in the horizontal plane. Thus, the slide thrust of the tools is at the point of work support.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

COOLANT SPOUT (L1)

The improved "Bullseye" coolant spout is readily adjusted by finger-tip pressure to any angle or curve, easily fished under, over, through or around rigid machine parts, according to the



Flexible Coolant Spout

J. N. Fauver Company, Inc., Detroit.

This flexibility permits easy re-adjustment as the work progresses and eliminates elbows, tees, ells, connectors and adapters. The spout is available in a range of sizes, ⅛ to ¾ I. D., in any length, and is said to be leakproof, rustproof and scaleproof. They are adaptable for oil, air, water, steam and grease.

CARBIDE TOOL GRINDER (L2)

Any desired combination of diamond, silicon carbide or aluminum oxide wheels can be used with this new grinder, according to Thomas Prosser & Son, 120 Wall Street, New York, the manu-

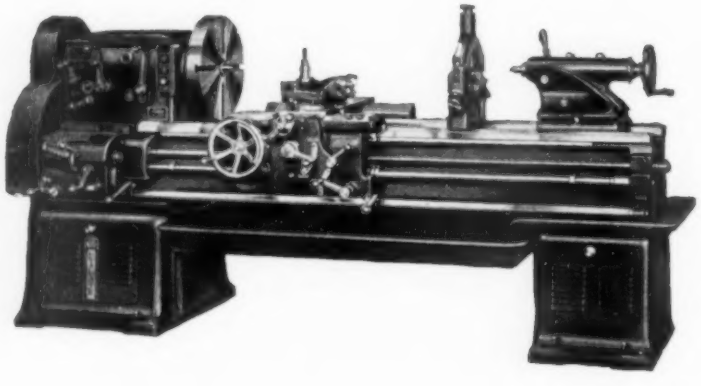
New Carbide Tool Grinder

facturer. This grinder has a new heavy base, a drum type on-off-reverse switch, heavier tables and a storage compartment for wheels and tools.

This new machine is said to provide for rapid removal of metal when roughing and also accurate finishing of all single point tools. Another feature is said to be the quick-acting indexing device

(Continued on page 178)

LONG WINGS EQUAL GREATER EFFICIENCY



The Metalmaster

1840 - 1943

The carriage of this Bradford M M Model Geared Head Lathe has exceptionally long wings, carefully planed and handscraped to a full length bearing, with gibs both front and rear. During facing operations, a clamp located on the right front wing locks the carriage. The bridge is wide and heavy with a large dovetail section for the cross slide. The operator can easily read the chasing dial when cutting threads because it is constructed as an integral part of the carriage and conveniently located. The rear of the carriage is planed and tapped so that a taper attachment can be added at any time. Write for complete information.

ALSO MANUFACTURERS OF DRILLING AND TAPPING EQUIPMENT

THE BRADFORD MACHINE TOOL CO.

EVANS STREET SOUTH OF EIGHTH, CINCINNATI, OHIO

PRECISION TOOLS SINCE 1840

An Extra 2 to 3 Points Rockwell C Hardness Plus Extra Toughness in Tool Steel by *Cold Treating* in a Deepfreeze Industrial Chilling Machine

Deepfreeze −120° Cascade Industrial Chilling Machine with extra deep chilling compartment to accommodate long shafts.

● A prominent machine tool manufacturer obtains an extra 2 to 3 points Rockwell C Hardness in S.A.E. 4615 steel horizontal circular ways by cold treating in a Deepfreeze −120° Cascade Industrial Chilling Machine. By regular heat treating, 57 to 60 Rockwell C Hardness is obtained. Chilling in a Deepfreeze Machine at −100° F. results in an average of 60 to 62 Rockwell C Hardness.

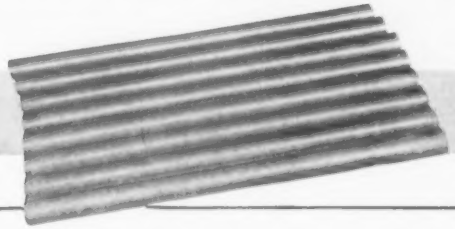
In addition, the straightness of the bar is not distorted by cold treating which was the case in further normalizing operations that were previously used. Through the use of Deepfreeze cold treatment this manufacturer obtains a better and harder machine tool way which will stand up longer and practically eliminate wear.

Free Engineering Assistance

Whether you have a problem in metal shrinking, treating, or testing, or whether you're not sure if Deepfreeze can be applied to your manufacturing, Deepfreeze Engineers are available to assist you in obtaining the advantages of cold treating. Send an outline of your problem together with parts or prints for a preliminary analysis and test. There is no obligation.

Free Additional Information

For additional information on Deepfreeze equipment send for free copy of bulletin with complete details, specifications, and listing other uses.



Above—Horizontal Steel Circular Ways used in Precision Machine Tool.

TECHNICAL DATA

Part—Horizontal way 2½" dia. x 36" long.

Material—S.A.E. 4615 steel. Weight—46 lbs.

Number per Load—12.

Operation—Deepfreeze at −100° F. to obtain additional hardness.

Result—After heat treating, 57 to 60 Rockwell C hardness was obtained. After Deepfreeze, 60 to 62 Rockwell C hardness is accomplished. In addition, cold chilling did not affect the straightness of the bars which was the case with heat normalizing.

A Few Typical Applications of Deepfreeze . . .

In addition to the treatment of tool steel, Deepfreeze Chilling Machines are finding many other money-saving applications in a wide variety of industrial fields. Here are a few typical applications of Deepfreeze sub-zero temperatures . . .

Used for shrink fit of a 5" plug in the assembly of a 75 mm gun mount.

Gage blocks treated to hold finished size under normal temperature changes and handling.

Replace costly and dangerous liquid oxygen and hard-to-handle dry ice in shrink-fit assembly of piston bushings.

Used to test certain portions of aircraft lubricating system and instruments.

Used for the seasoning of machine tool spindles and spindle housing.

Deepfreeze

2311 DAVIS STREET
NORTH CHICAGO, ILLINOIS

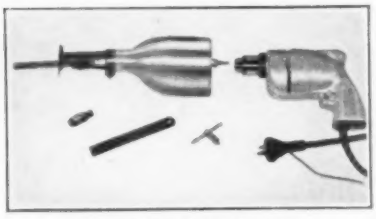
Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

Division of Motor Products Corporation, Detroit, Michigan

which permits setting of the table to the desired angle and holds it there.

The machine carries 7 inch wheels. Hub location on the shaft is adjustable to compensate for wheel wear. The face of the wheel can be kept close to the edge of the table, it is claimed. Spindles run in high grade precision ball bearings, with adequate dust seals and elimination of all end play.

Among the attachments that can be furnished for the machine is a device for grinding carbide or high speed steel drills of various sizes. Another one is an arrangement for the grinding of lips in the surface of the tool to curl or break the chips when turning steel.



Saw Gun Attachment

SAW GUN ATTACHMENT (L3)

The new saw-gun recently announced by Mid-States Equipment Company of 2429 South Michigan Avenue, Chicago is described by the manufacturer as an attachment for electric drill, flexible shaft or compressed airline which makes a power saw or file.

Said to save time on panel notching, slotting or other fabricating operations, this tool can be used, according to the manufacturer, on plastics, stainless steel, Monel metal and corrugated or plain steels in heavy gauges.

It is also said to work effectively as a file in places which are hard to get at. It is recommended for use on drill with speed of 2000 rpm or more. This attachment can also be furnished as a complete unit with heavy duty drill and chuck.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

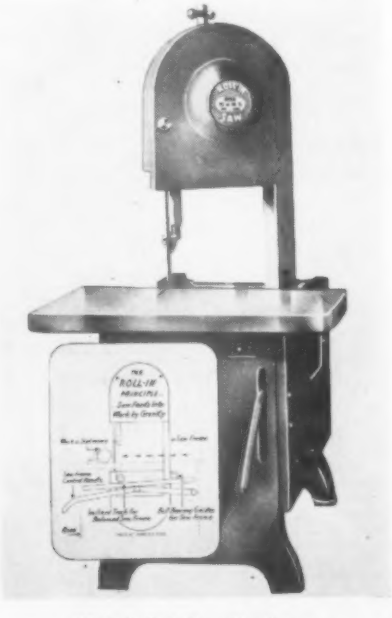
METAL CUTTING BANDSAW (L4)

An exclusive new gravity feed principle is said to be the outstanding feature of the new metal cutting bandsaw recently announced by Universal Vise and Tool Company of Parma, Michigan. Claimed to be adaptable for cut-off, trim and contour work, the saw has a blade which feeds into the work through movement of balanced blade wheel frame on an inclined track.

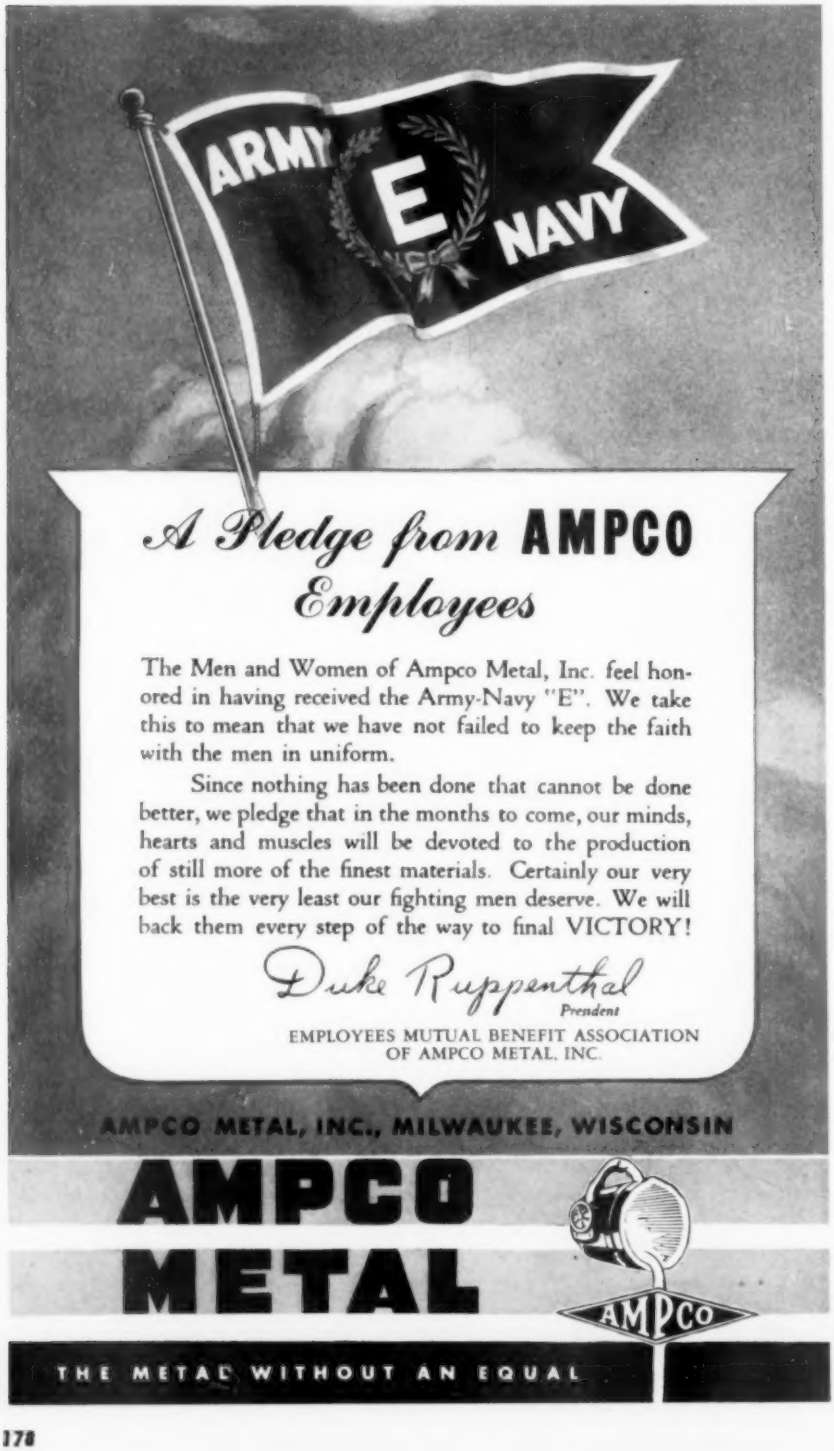
The manufacturer states that blade pressure is automatically regulated by texture and degree of hardness of metal being cut. The swivel block for holding the work is removable for contour jobs or long straight cuts. The saw blades handled range from 8 feet 6 inches to 9 feet and three widths — ¼, ½, and ¾ inch.

The machine has three speeds of 81, 161 and 264 feet per minute and a cut that is vertical and down. The maxi-

(Continued on page 180)



Metal Cutting Bandsaw


ARMY
E
NAVY
A Pledge from AMPCO Employees
The Men and Women of Ampco Metal, Inc. feel honored in having received the Army-Navy "E". We take this to mean that we have not failed to keep the faith with the men in uniform.
Since nothing has been done that cannot be done better, we pledge that in the months to come, our minds, hearts and muscles will be devoted to the production of still more of the finest materials. Certainly our very best is the very least our fighting men deserve. We will back them every step of the way to final VICTORY!
Duke Ruppenthal
President
EMPLOYEES MUTUAL BENEFIT ASSOCIATION OF AMPCO METAL, INC.
AMPCO METAL, INC., MILWAUKEE, WISCONSIN
AMPCO METAL
AMPCO
THE METAL WITHOUT AN EQUAL

Revolutionary NEW Carbide Tipped Cutter by Super!

New High Efficiency Cutter Slashes Milling Costs . . .

Here's money-saving news for production men! Faster milling with better finishes and greater accuracy . . . . *at lower cost!*

That sums up the advantages of this new carbide tipped milling cutter by Super Tool Company. It's new in design, new in performance—and new in the way it brings new standards of economy to your milling operations.

It's fast! In cast iron and non-ferrous materials it can operate at machine capacity with feeds of .002″ to .005″ per tooth. In steel you can run it at surface speeds of 400 to 800 feet per minute with a tooth load of .0005″ to .0025″. *This means table feeds of from 5″ to 18″ per minute.*

It's more accurate! Faster operating speeds mean less cutting pressure with less distortion of work. At high cutting speeds the chips carry off much of the heat, leaving only a portion to be absorbed by the work and the cutter. And the high speed of this cutter produces a fine finish comparable to a ground finish.

It's more economical! Initial cost is lower. It produces more work and better work—faster. And it is designed to be used for slotting, side milling, face milling or half side milling without alteration.

There are many more money-saving features of this new carbide tipped milling cutter that you should know. May we send you a descriptive folder giving prices and full details?

Most Sizes Available for Immediate Shipment NOW—
others in two to three weeks

SUPER TOOL CO. 21650 Hoover Rd. Detroit 13, Michigan

Carbide Tipped Tools

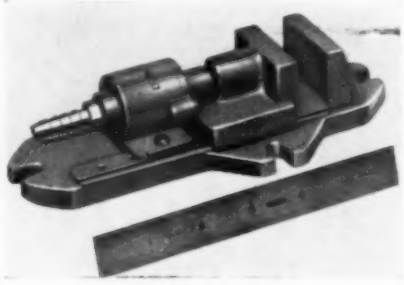
FOR TURNING • FACING • REAMING • SPOTFACING • BROACHING
FORMING • GRINDER RESTS • WEAR PARTS • BORING • MILLING • DRILLING
GROOVING • COUNTERBORING • SHAVING • CENTERS • SPECIAL PURPOSES

mum cut is 7 inches vertically while the blade can travel 7 inches into the work. It is claimed, that by re-setting the work, any length cut can be made. The work table area measures 18½ by 30 inches.

MIDGET AIR VISE (L5)

The midget air vise recently announced by Mead Specialties Company of 15 South Market Street, Chicago is said to facilitate a variety of light drill press operations, bench assembly jobs and light milling jobs such as screw slotting operations.

Called the model 10, this vise has an overall length of 7½ inches and an overall width of 3½ inches. Three locations of the cylinder are provided to give jaw openings from 0 to 5/8 inch, 5/8 to 1¼ inches, 1¼ to 1⅞ inches. Smooth action and parallel grip are said to be assured because the jaw slides on dovetail ways.



New Small Air Vise

Ordinarily used with a foot control valve, this vise has a maximum stroke of 5/8 inch. The manufacturer states that jaw pressure is 8/10 of line pressure.

NEW PORTABLE ELECTRIC TOOL (L6)

A new portable electric tool that has reciprocating action was recently announced by the H & H Research Company, 442 Marquette Building, Detroit. Made in two models, the new tool is designed for filing, burring and chamfering, honing, polishing and lapping, scraping, sawing and sanding.

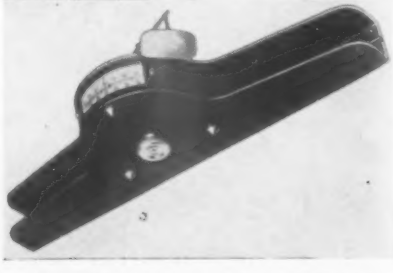
All-Purpose Electric Tool

Incorporating push-and-pull action, both models have a rate of stroke ranging from 1000 to 1200 per minute. Model CX has a ⅜ inch stroke while Model EX has a ⅛ inch stroke. The power of stroke is said to be 30 to 40 pounds.

Having a total weight of 5 pounds, this new electric tool has a pistol grip and is equipped with a conveniently located finger control switch.

VERNIER ANGLE GAGE (L7)

A vernier angle gage called the Clinometer has been introduced by Engis Equipment Company of Chicago. Recommended for use wherever angles



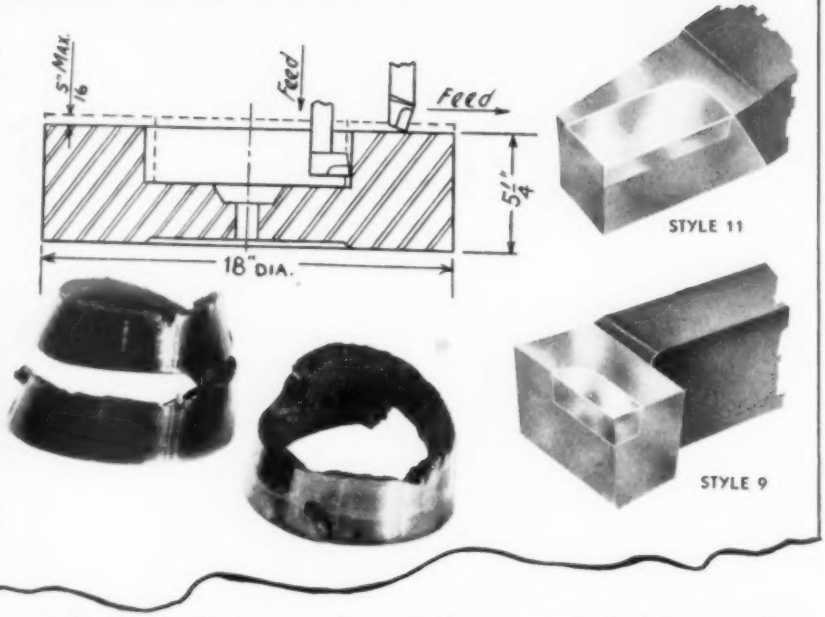
"Clinometer" Vernier Angle Gage

(Continued on page 182)

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

To Cut Sandy Steel Castings USE KENNAMETAL* CARBIDE TOOLS



★ On this machining operation tool life was very limited because the exceptionally hard sandy castings caused excessive tool breakage. KENNAMETAL was installed—the following data proves again the superiority of KENNAMETAL'S performance even under adverse conditions.

KENNAMETAL Style 11 tool was employed for the turning and facing and tool Style 9 was used for the boring operation. Chips produced are illustrated actual size. The 18" casting was turned and faced at 148' per minute with a 5/16" depth of cut and a feed of .068". At this feed KENNAMETAL finished 3 castings before tools showed appreciable wear.

For information on the handling of KENNAMETAL tools for various operations, write for your copy of the KENNAMETAL tool manual.

KENNAMETAL THE All American CARBIDE

*Invented and Manufactured in U.S.A.

McKENNA METALS Co.

600 Lloyd Ave., Latrobe, Pa.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain

HOW GORTON saves time ON PROFILE MILLING WITH SEMI-SKILLED OPERATOR

GORTON

9-J Super-Speed Vertical Mill with Duplicator Table and Tracer Profiles Crankshaft Part in 15 Minutes Floor-to-Floor Time

● This prominent airplane engine manufacturer (name on request) utilizes semi-skilled help for operating Gorton Super-Speed Milling Machines and Duplicators. The operation being performed is *Profile Milling of a .738" Radius on the Rear Section of a Steel Crankshaft.* Feed is by hand, spindle speed is 500 r.p.m. using a special .738" diameter four-fluted ball cutter. (This cutter is ground on a Gorton 375-2 Cutter Grinder.)

This is an excellent example of the ease of operation of Gorton High-Speed Millers and Duplicators in performing unusual operations.

AN EASTERN MANUFACTURER OF TOOLS AND DIES WRITES: "... MOST IMPORTANT TODAY IS THE FACT THAT WE CAN USE WOMEN TO OPERATE THESE MACHINES."

These are but two of many ways in which Gorton Super-Speed Milling Machines are saving vital man hours on form milling. Perhaps you, too, can save additional hours on your present or new milling equipment. Gorton Engineers, specialists in Vertical High-Speed Milling, will be glad to make recommendations on your work—without obligation.

SUPER-SPEED MILLING DATA

OPERATION—Profile Mill .738" Radius.

MACHINE—Gorton 9-J Super-Speed Vertical Mill with Duplicator Table and Tracer.

PART—Rear of Crankshaft—Steel.

CUTTERS—Special .738" dia. Ball Cutter—Profile Form Type—4 Flute.

HOLDING—Special Fixture.

FEED—Hand.

SPINDLE SPEED—500 r.p.m.

STOCK REMOVED—⅛".

FLOOR-TO-FLOOR TIME—15 Minutes.

FREE

Additional data and specifications are included in this booklet. Write for your copy today. Ask for Catalog No. 1400-B.

GEORGE GORTON MACHINE CO.

1322 RACINE STREET, RACINE, WISCONSIN, U.S.A.

SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER SPEED VERTICAL MILLING

and inclinations have to be checked, the instrument is available in five models.

This gage is said to be used in the aviation industry for checking propeller blades, wing and tail sections and fuselages. In the general manufacturing plant it is used in leveling the setup of machine tools and on fixtures and jigs to check angles and alignments.

Precision measuring by this instrument is accomplished by a new gravity mechanism, according to the manufacturer. The action of the instrument is by a free swinging drum graduated in 360 degrees and supported by ball bearings. When the device is applied to an inclined surface, the drum swings to a position which brings its center of gravity under its center line. The degrees of inclination can be read from a pointer located above the drum.

Reading is said to be facilitated by a patented brake mechanism, and by an attached magnifying glass which enlarges both the degree scale and the vernier scale.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

NEW WELDER (L8)

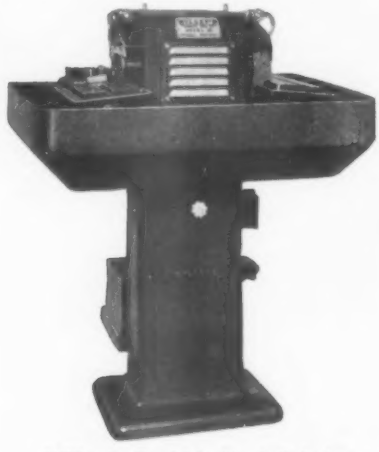
The new Ampac "200" welder is said to be an important step forward in alternating current welding, according to the manufacturer, the Allis-Chalmers Mfg. Company of Milwaukee. Described as the welder with the ideal operating curves, it is said to automatically give the operator correct voltage for the continuous range of currents available.

Another feature of the new welder is said to be an integrated reactor-transformer construction which provides high, yet safe voltage for welding at low currents. It is claimed that the reactor coils which surround the variable air gap assure active duty from every line of flux.

The construction of this new welder uses fewer working parts, and is said to cut maintenance down to routine lubrication twice a year.

NEW CARBIDE TOOL GRINDER (L9)

A new carbide tool grinder, called the Model 30, was recently introduced by Willey's Carbide Tool Company of 1340 West Vernor Highway, Detroit. Designed for the free hand grinding of



Willey's Carbide Tool Grinder

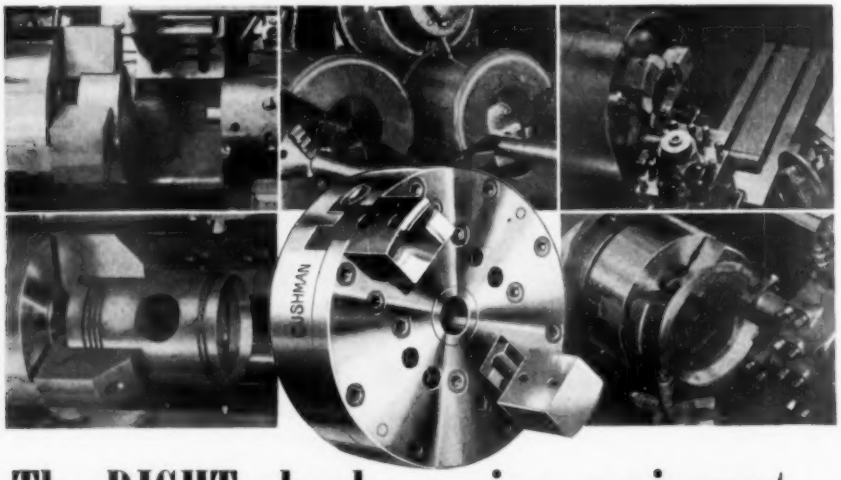
tungsten carbide tipped tools as well as other hard metal tools, the machine is said to handle rough, semi-finish and finish grinding.

The grinder handles an eight inch vitrified wheel for rough and semi-finish, and a six inch diamond wheel for finishing. The manufacturer states that a cool cutting action of the wheels is assured through a steady flow of coolant which is force fed by an electrically driven pump connected with a tank attached to the base of the grinder.

The tool rest table of this new grinder is semi-steel and measures 16 by 7 inches. It has angular adjustment from horizontal position of 30 degrees. Adjustment of the table to and from the wheel is controlled by means of a specially designed locking and releasing clamp. A keyway is provided for the protractor, tool guide and dresser.

The machine has a drum type reversing switch and a fully enclosed, ball bearing, 3450 rpm reversible type motor.

THE END.



The RIGHT chucks and jaw equipment

speed production...reduce rejects

● Illustrations above show a number of ways in which Cushman Chucks have been adapted to hold ordnance and other special parts by the use of easily made removable top jaws that bolt to master jaws in standard chuck bodies. Set-up is simplified, floor to floor time in production reduced to a minimum, high standards of machining accuracy assured. Practically all so called "special" work holding needs can thus be met with a minimum of tool-room work and with a high degree of flexibility in changing from production of one part to another on the same machine.

Cushman engineers have a broad background of experience to draw upon in helping you with work holding problems. Do not hesitate to call upon us for assistance. We are always ready and anxious to help. The Cushman Chuck Company, Hartford, Connecticut.

These small "Chuch Check" maintenance cards can be given to operators or put on bulletin boards. They'll help save time, save chucks and reduce spoilage. Ask us to send you some.

CUSHMAN

A World Standard for PRECISION

"FIT FOR DUTY"

● Only first-class cutting tools can turn work out fast enough – and accurately enough – to be rated as "fit for duty" on today's vital production line!

Ship worn-out High Speed Tools back to the steel mills – this high grade steel can do another war job.

MORSE THERE IS A DIFFERENCE **TWIST DRILL AND MACHINE COMPANY**

NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

STEELED for the Knock-out Drive

"ALLENS"

— like our spearhead commanders, pack the qualities of tested steel. In men it's mettle, in screws it's metal but the two are one in beating opposing forces. In machines of war *or* production, the forces opposed to hollow screws are mechanical shocks, violent stresses, vibration. By strength of material, by special processes of forming, by accurate threading, "ALLENS" uphold the invincible Quality that gets our fire-power to enemy capitals — *via the Knock-out Drive!*

THE ALLEN MANUFACTURING COMPANY
HARTFORD, ... CONNECTICUT, U.S.A.

LESS OPERATIONS
AND FAR
BETTER WORK
WITH A
GATCO
ROTARY PILOT BUSHING

Pilot bushing fits with a PUSH fit, therefore a perfect bore

ROUND-CHATTERLESS-SMOOTH

DUST-PROOF

AS A WATCH

GATCO Rotary jig and pilot bushing is built for core drilling, diamond boring, turret tool piloting, piloting hollow mills, line reaming, carbide boring, spot facing, etc.

Write for full information and prices

GIERN & ANHOLTT TOOL COMPANY
1312 Mt. Elliott Avenue, Detroit, Michigan

DIAMONDS *for Victory*

for Victory

Special $25.00 Complete

"ANGLE-SET-MAGNET-BLOCK"

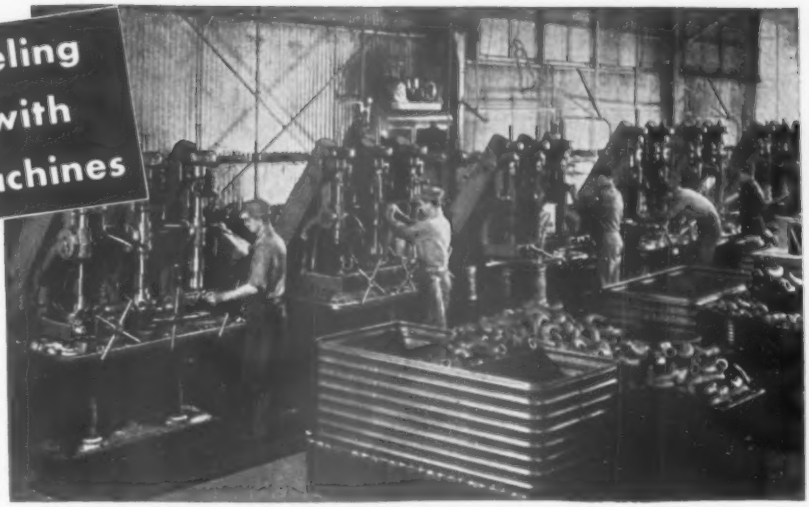
For Magnetic Chuck Grinding. Keep Surface Grinder Wheels in good order. A boon to tool and die makers. Suitable for wheels up to 8" dia. Larger diamonds can be used for larger wheels. Comprises three units: Block — 2½x3x1, 12° "Angle-Set" and BIG-HED-NI8 with No. 10-CNX Diamond. Two LOC-KEY-SET Screws. Arrow indicates wheel direction.

Write for No. 3 Catalog illustrating most complete and up-to-the-minute line of Diamond Tools.

RE-SET-ABLE LOC-KEY-SET Re-setting $1.0 each tool. Mailing envelopes Free to Victory Plants. Grinders' instruction card free.

DIAMOND TOOL COMPANY, Not Inc.
Sheldon M. Booth, Pres.
938 E. 41st Street CHICAGO, ILL.

High-production Beveling of Welded Fittings with BARNESDRIL Drilling Machines



This prominent manufacturer had a special machining problem of beveling welded fittings on a production basis. A battery of BARNESDRIL Gang Drills now gives the production required with the desired accuracy. The view at the right is part of the battery of 3 and 4-spindle 24" Self-Oiling, All-Geared Gang Drills set up in this shop tooled for beveling the welded fittings.

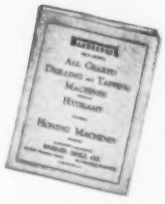
BARNESDRIL Machines Available in Sizes to Handle Work From ½" to 4" Diameter

BARNESDRIL Machines for fast, accurate drilling, tapping, reaming, boring, and similar operations are available in standard and special single and multiple-spindle, gang, and high-production units. These machines will handle work from ½" to approximately 4" diameter.

BARNESDRIL Engineers are available to help you select the proper machines for your job. Send in the complete facts...no obligation.

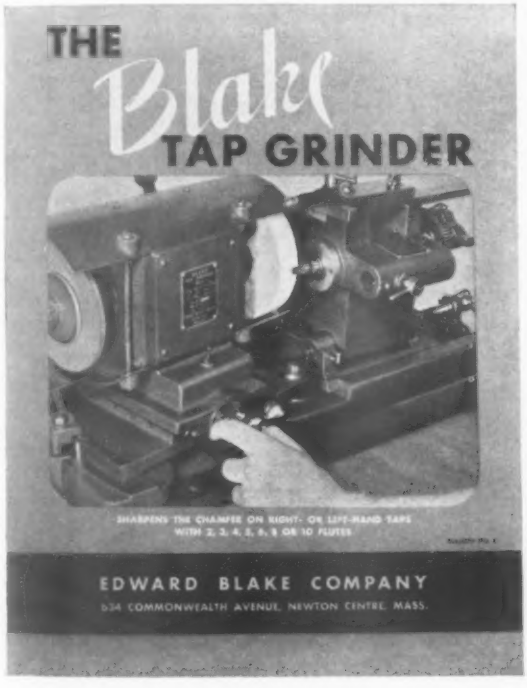
Free Drilling Data

Write today for free copy of Catalog T, including detailed data covering the complete line of BARNESDRIL Self-Oiling Drilling, Tapping, and Honing Machines.



848-71 CHESTNUT STREET

Barnes Drill Co. ROCKFORD ILLINOIS, U.S.A.



Send for this Catalog

This new catalog covers the production capabilities of the No. 1 and No. 2 Blake Tap Grinders from A to Z. It shows construction and operation features that are giving manufacturers thousands of extra holes from every tap. It shows standard and special equipment that is doing the unusual as well as the everyday tap sharpening jobs. It discusses correct sharpening methods for small lots or quantities of taps and other tools — any with relief at the point. It will pay you to mail the coupon today!

Please send me the NEW Blake Tap Grinder Catalog today.

NAME..... TITLE.....

COMPANY .....

STREET .....

CITY..... STATE.....

MAIL THIS COUPON TODAY!

T.E.

EDWARD BLAKE COMPANY
634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — L & D HIGH SPEED DRILL PRESSES

NEW LITERATURE

T. M. REG. U. S. PAT. OFF.

OF INTEREST TO PRODUCTION EXECUTIVES

(767) Tools

Turret Lathe Tools. 176 pp. The Warner & Swasey Company, Cleveland, Ohio. This is the new pocket size edition of the manual. It contains the complete line of turret lathe tools being manufactured by this concern. Tools for both bar and chucking work are included. In addition to photographs and descriptions of each tool, there are diagrams showing typical applications. This manual is completely indexed.

(768) Lubrication

90 Years of Industrial Pioneering. 40 pp. Swan - Finch Oil Corporation, R. C. A. Building, West, New York City. This new booklet presents the history of this company and the progress in the development of lubricating oils. Reproductions of many old industrial prints are included in the booklet.

Send
for copies of the new McCrosky Quick-Change Chuck Manual. It features 21 pictures showing successive steps in drilling and tapping. Other operation and maintenance instructions covered include removal and replacement of chuck collars and adjustment of tap-holder friction. Write to
McCROSKY
Meadville, Pa.
McCROSKY TOOL CORPORATION

McCROSKY COST CUTTING TOOLS

◆ SUPER ADJUSTABLE REAMERS ◆ ADJUSTABLE BORING BARS
◆ JACK-LOCK MILLING CUTTERS ◆ WIZARD CHUCKS ◆ TURRET TOOL POSTS

(769) Hobs

Facts About Small Pitch Hobs. 15 pp. Barber-Colman Company, Rockford, Illinois. The information presented in this new booklet is said to give a better understanding of the problems of producing and using hobs in a manner which will provide the utmost in accuracy and production. It is illustrated with both line drawings and photographs.

(770) Indicator

The Testmaster Dial Indicator. 4 pp. Federal Products Corporation, 1144 Eddy Street, Providence, R. I. This folder illustrates and describes the new dial indicator recently announced by this concern. Many features are mentioned.

(771) Steel

Cromoco Air-Hardened Die Steel for High Production. 4 pp. Firth-Sterling Steel Company, McKeesport, Pa. This new folder discusses such subjects as composition, characteristics, applications, hardening, drawing and expansion properties of the steel. Illustrations are included.

(772) Automatic Screw Machine

New Gorton 16-A Precision Automatic Screw Machine. 16 pp. George Gorton Machine Company, Racine, Wisconsin. Parts made by this machine are shown actual size in this profusely illustrated booklet. Other pages include a typical cam and tool layout, attachments for the machine, specifications, line drawings of the tooling method, and features of the machine.

(773) Tube Spinning

Spun End Tube. 28 pp. Wolverine Tube Division, Detroit. A concise story of tube spinning is presented in this new brochure. Illustrations show many of the varied shapes that have been made, and contains drawings showing graphic comparisons between the old and new methods and the many operations that can be eliminated.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

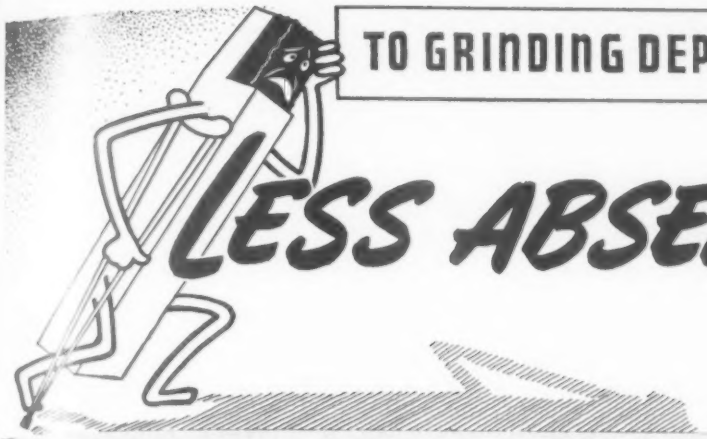
(774) Dies

Cemented Carbide Die Manual. 32 pp. Carboloy Company, Inc., Detroit. Standard and special dies for drawing wire, bar, tubing and sheet metal are covered in this new manual and catalog. Detailed recommendations on die shapes for drawing round wire, bar and tubing are given. The manual reveals that this concern's line of dies has been expanded.

(775) Milling Machines

A Handbook on the Nichols Miller. 86 pp. Nichols-Morris Corporation, 50 Church Street, New York City. Many of the various jobs that can be done on

(Continued on page 188)



LESS ABSEN-TOOL-ISM

with

TECO CARBIDE TOOLS

A great deal has been written about absenteeism among workers. But cutting tools that go off the job too often, also slow down production.

Reduce this "absen-tool-ism" by using TECO Carbide Tools . . . the carbides that stay on the job longer. They hold cutting edges and maintain accurate tolerances for longer runs, producing more pieces between grinds. Less grinds mean less machine-down time—thus more productive hours for your men and machines.

The greater resistance to wear and breakage provided by TECO Carbide Tools, is the result of rigidly controlled hardness, density and uniformity. TECO Carbide Tools and Blanks are available in grades, styles and sizes for practically every machining need. Have a representative discuss your requirements. Write for detailed catalog.

...cut at higher speeds

. . . hold cutting edges longer

...produce more pieces between grinds

... reduce grinding and re-tooling time

TUNGSTEN ELECTRIC CORPORATION

570 39th STREET • UNION CITY, NEW JERSEY

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

Rep.: Architects and Builders Building, Indianapolis, Ind.

Pioneers in Tungsten Carbides for over a Quarter Century

TECO CARBIDE TOOLS

the miller are illustrated and described in this new handbook. Among the kinds of work described are form following, facing, boring and turning.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(776) Joints and Assemblies

Beco Shaft Joints and Assemblies. 48 pp. Brooks Equipment Corporation, 90 West Street, New York City. This new booklet presents an universal joint that operates at angles from 0 to 360 degrees in any plane, according to the manufacturer. Data sheets, blueprints and photographs are included. Other products are also mentioned in the booklet.

(777) Cutting Fluids

Cutting Fluids. 20 pp. Tide Water Associated Oil Company, 17 Battery Place, New York. Sections of this new booklet are devoted to types of cutting operations, functions of cutting fluids, selection and application of cutting oils, soluble oil emulsions and cutting tools. It also contains the S. A. E. steel numbering system, chemical composition charts and machinability index.

(778) Honing

The Barnesdril Honing Process. 16 pp. Barnes Drill Company, Rockford, Illinois. Not only are the various honing machines manufactured by this concern illustrated and described in this new booklet, but also the many different types of honing work that may be done with the machines. Different examples of work are shown and the largest honing machine in the world is pictured.

(779) Taps

22 Reasons Why a Good Tap Can Go Wrong. 8 pp. Greenfield Tap and Die Corporation, Greenfield, Massachusetts. This is the third pamphlet in a series on tool conservation. Illustrations are included which help bring home important points in the correct usage of tools.

(780) Springs

Spring Design and Engineering. 40 pp. Mid-West Spring Manufacturing Company, 4262 South Western Avenue, Chicago. This new manual is said to be very complete in formulas of spring design and engineering for compression, extension, torsion, flat spiral or motor, flat springs and wire forms. Tables, diagrams and illustrations are numerous.

(781) Steel

Machinery Steel Selector. Horace T. Potts Company, Philadelphia. This guide to the selection of the proper machinery steel for a given duty describes the Elastuf group of steels in terms of ready-for-use physical properties. A discussion of the practical evaluation of tensile properties is included.

(782) Finishing

Complete Abrasive Belt Polishing System. Divine Brothers Company, Utica, New York. The bulletin describes in detail a number of inter-related units, including contact rolls, constant and variable speed lathes and an abrasive belt backstand device.

(783) Grinders

Grand Rapids Tap and Drill Grinders. 32 pp. Gallmeyer & Livingston Company, Grand Rapids, Michigan. Many of the grinding machines manufactured by this concern are illustrated and the specifications listed in this booklet. In addition, descriptive material on such subjects as the conditions required for a perfect working twist drill are included.

(784) Tools

Reltool Cutting Tools. 16 pp. Reliable Tool and Machine Works, Milwaukee, Wisconsin. Included in this catalog are illustrations, specifications and descriptions of milling cutters, metal slitting saws and combination center drills. A vertical surface grinder is also mentioned. Material is given on this concern's contract service.

(785) Dresser

Something New In an Angle Tangent to Radius Dresser. 4 pp. Perfex Dresser

(Continued on page 190)

LIBERTY

ATTACHMENTS
For Surface Grinders
Horizontal Type No. 90-10
Vertical Type No. 90-11

Adapts surface grinders to precision work wherever high speed wheel is required.
On and off in 2 minutes.
Drive is direct from surface grinder spindle.
Sold with solid quill or collet chuck.

Represented in leading Cities and by

James W. George Mach. Co., Detroit, Mich.
F. H. Robertson Co., Malden, Mass.
G. W. Brunton & Son, Kenmore, N. Y.

IN CANADA
The Canadian Fairbanks-Morse Co., Ltd.

IN SOUTH AMERICA
Sabin St. Germain Associates, 285 Madison Ave., New York.

LIBERTY
Tool & Gage Works Inc.
233 Georgia Avenue
Providence, R. I.

Tomorrow's Tools for Today's Tasks

HOW PROCESS ENGINEERS SAVE TIME IN MACHINING MISCELLANEOUS HOLES!

Operator merely loads part and controls entire machining of nine holes by push button control. See data below on tooling and operations.

9 Spindle Unit-Type Machine Saves 39.21 Minutes in Drilling Airplane Engine Part

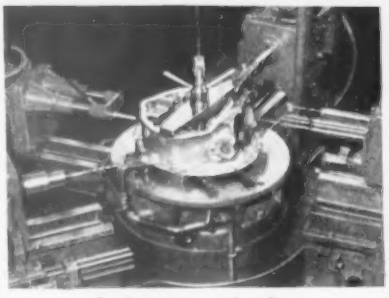
When process engineers, and others responsible for laying out production lines, are called upon to increase production over that obtained from standard single spindle machines they specify multiple spindle unit-type machines for picking up the odd holes. This is the best method and equipment available for doing this difficult job.

On this particular machine (one of many W. F. and John Barnes Unit-Type machines installed in this plant) the machining time alone was cut from 42.31 minutes to 3.10 minutes. Additional savings were obtained in handling-time since nine spindles work simultaneously in place of one at a time. The operations covered are listed in detail in the column at the right.

"Special" Machine Production with Standard Machine Flexibility

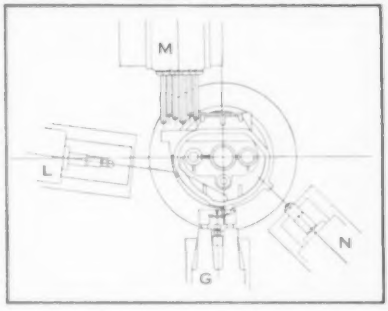
This, like other W. F. and John Barnes production machines are built from *standard* hydraulic feed and drive units. These can be mounted in any position and readily changed from one to another to meet any reasonable change in design of the part being machined. Many, now in use on war production, can be converted to peace time product manufacturing at the end of the war.

Perhaps you can save time and man-power by using these machines in your work. It isn't necessary to have unusually high production requirements to obtain the advantages of unit-type machines. Many have been furnished with interchangeable quick-change tool heads for machining different parts in moderate lot sizes. Let one of our engineers assist you in your selection of equipment for faster boring, milling, drilling, tapping, reaming and honing operations. Their experience in designing and building special machine tools for high production methods may help you with your war work. Call on them without obligation.



Crankcase Intermediate Rear for Radial Airplane Engine.

PART TOOLING AND OPERATIONS



Schematic diagram (plan view) of tooling used on four way unit-type machine. Operations performed by each unit are listed below:

No. of Spindles — 9.

UNIT L.— Drill 21/64 diameter.

UNIT M.— One 21/64" Drill.
One 11/32" Drill.
Four drills for 5/16—18 tap.

UNIT N.—One 9/16" Drill.

UNIT G.— One 9/32" Drill.

Type of cutting material — H.S.S.

ACCURACIES —
Diameters + .003" − .004'
Locations ± .010"
Angular Locations ± 1.0'

MORE PRODUCTION AND TOOLING IDEAS

Free set of eight bulletins describing a better way to get better machines. Each bulletin traces a machining problem from the original study of the part to the final machine design. Each may suggest a more productive tooling set-up that you can use today — valuable file information for tomorrow. Write for Bulletins 743.

W. F. & JOHN BARNES

W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

Corporation, 3607 Gaylord, Detroit. Advantages of this new dresser are explained in the folder. A keyed illustration shows the various parts of the dresser. Another illustration shows how one can set the diamond so that the radius will be true within .0001.

(786) Absenteeism

Ways of Dealing with Absenteeism. 28 pp. War Production Board. Issued by the WPB's War Production Drive Headquarters for the guidance of its Labor-Management Plant Committees, this pamphlet deals with methods effectively used in combating the in-plant causes of absenteeism.

(787) Plastic Tubing

Mills Plastic Tubing and Fittings. 6 pp. Elmer E. Mills Corporation, 812 West Van Buren Street, Chicago. Listing the various uses of this product in many fields, the circular gives detailed data and physical properties of the plastic. Illustrations show how to flare the tubing and how to form it and make permanent bends without kinking.

(788) Synthetic Rubber

The Five Commercial Types of Synthetic Rubber. 40 pp. United States Rubber Company, Synthetic Rubber Division, 1230 Sixth Avenue, New York City. The publication includes photographs of synthetic rubber manufacture, diagrams and a chart compiled from the experience of plant and laboratories of the company. The development of synthetic rubber is traced and the properties of commercial synthetic rubber are described.

(789) Arc Welding

Type WD Direct-Current, Single-Operator Arc Welding. 12 pp. General Electric Company, Schenectady, New York. Listing the six important advantages of this type of welder, the new bulletin describes the operation of the machine. Cutaway illustrations show important construction details. Typical work being done by the welder is illustrated.

(790) Cleaning

Composite Answers to a Recent Questionnaire. 8 pp. L & R Manufacturing Company, 54-56 Clinton Street, Newark, N. J. Questions and answers on the use of L & R precision cleaning machines and solutions are given in this new folder. The various cleaning machines and solutions are described and illustrated.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

(791) Time Delay Relay

Synchronous Motor Driven Time Delay Relay. 4 pp. The R. W. Cramer Company, Inc., Centerbrook, Connecticut. Known as bulletin 800, this new piece of literature describes and illustrates the type TDC time delay relays. Such subjects as application, construction, distinctive features and housing are discussed.

(792) Soldering

Lloyd's No. 6 Soldering Fluid. 6 pp. Lloyd S. Johnson Company, 2241 Indiana Avenue, Chicago, Ill. The folder explains the various types of soldering work for which this fluid is said to be ideal. The use of this fluid for lead burning is also described. A price list is included in the folder.

(793) Grinding Wheel

Here's a Grinding Wheel That Can Increase Production on Many Jobs. 6 pp. Norton Company, Worcester, Mass. The folder tells about the Norton open structure grinding wheel. Description and illustrations are given on the types of jobs to which this type of grinding wheel can be applied.

(794) Measuring and Control Instruments

Wheelco Measuring and Control Instruments. 16 pp. Wheelco Instruments Company, Harrison and Peoria Streets, Chicago. This is a new issue of this concern's condensed catalog, and gives current prices and short descriptions of all their instruments. Line drawings and illustrations are included.

(795) Riveting

One Person Bucks and Rivets. 8 pp.

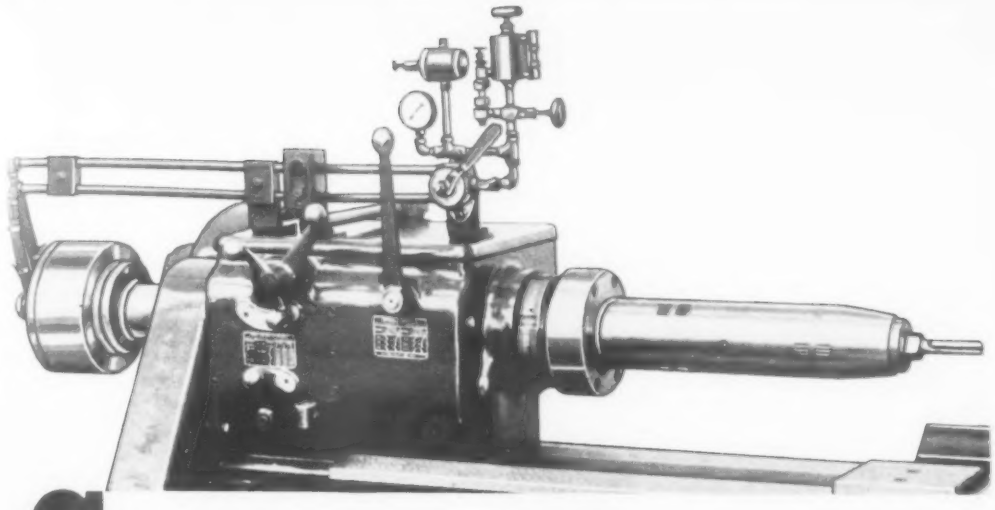
(Continued on page 192)

Tannewitz
VARIABLE SPEED
BAND SAWS
Are
Metal-Cutting
EXPEDITERS!

Removing gates and risers from steel, cast iron, manganese bronze, hard and soft brass, aluminum and magnesium castings, as well as many other metal cutting jobs, are handled with great dispatch and surprising savings on TANNEWITZ VARIABLE SPEED BAND SAWS. And since they are available in any 3:1 speed ratio from 100:300 to 1000:3000 blade feet per minute, with instant adjustment to intermediate speeds, one machine serves ideally for cutting a variety of materials. Made with 30", 36" and 42" wheels.

Other models (single speed) for such purposes as sawing large blocks of aluminum and magnesium, cutting large steel templates etc., are available in capacities and speeds to ideally accommodate work of practically any size or character. Get a line on the TANNEWITZ metal cutting Band Saw that fits your particular needs. It will save time and repay its cost many times over. Simply ask for "Metal Cutting Band Saw Bulletin".

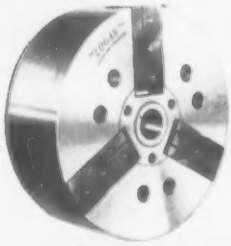
THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.



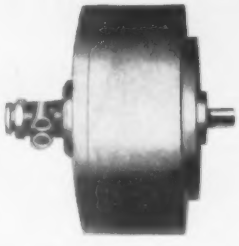
Save...Time, Effort, Motion

with Power Chucking

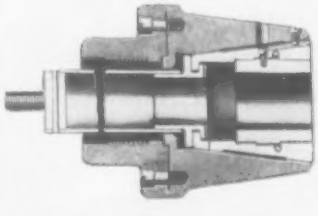
"LOGAN" Air and Hydraulic Equipment will increase production, lower unit cost, reduce spoilage and hold operator's fatigue to a minimum. Regardless of the production job, it will pay you to investigate *"LOGAN"* Equipment for in all probability the job can be done *Faster* and *Better* by air or hydraulics. Installation is simple and fast and most standard *"LOGAN"* Air and Hydraulic Equipment is available now. Because of easy operation, inexperienced employees quickly learn to use this equipment and produce at full capacity of the machines. With *"LOGAN"* equipment you save time, effort, motion. *"LOGAN"* Representatives and *"LOGAN"* Engineers will be glad to help you on special air and hydraulic problems, or write or wire for catalogs.



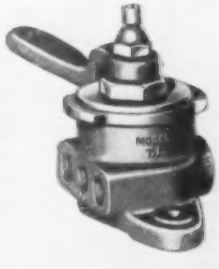
"Logan" Model 330
Universal Chuck



"Logan" Model R
Air Cylinder



"Logan" Model 160B
Collet Chuck



"Logan" Model TL
Air Control Valve

"LOGAN"

LOGANSPORT MACHINE, INCORPORATED

902 Payson Road Logansport, Ind.

CEMENTED CARBIDE TIPPED
W-S Standard Reamers with carbide tips. Tapered shank (illustrated) and straight shank types. Sizes: ¼ to 1½.

20% PRICE REDUCTION

ON W-S STANDARD REAMERS

PRICES ON W-S STANDARD REAMERS **are *now down* 20%! These new, lower prices are the direct result of our greatly increased volume on reamers and new production facilities. The majority of W-S reamer sizes is in stock most of the time. In addition, we keep numerous semi-finished shanks on hand for grinding to in-between sizes. Each W-S tool is genuine CARBOLOY tipped. *(Other brands may be specified.)* . . . Carbide tipped tools are not just a specialty with us . . . we make them *exclusively*. You can *expect* and *get* uniform, high quality results with W-S tools. WENDT-SONIS COMPANY, HANNIBAL, MISSOURI.**

Write for FREE Catalog 942 and LATEST PRICES!

WENDT-SONIS

CARBOLOY CUTTING TOOLS

CENTERS ★ DRILLS ★ CORE DRILLS ★ COUNTERBORES ★ SPOT FACERS
END MILLS ★ REAMERS ★ HOLLOW MILLS ★ LATHE BITS ★ SPECIAL TOOLS

—NEW LITERATURE—

Aero Tool Company, Burbank, California. This new folder illustrates and describes the automatic bucker made by this concern. Line drawings show methods of operation, and specifications are given for both bench type and portable models. The various parts of the bucker are pointed out.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

(796) Gages

Cylindrical Plug and Ring Gages. 4 pp. Swedish Gage Company of America, 8900 Alpine Avenue, Detroit. Plug gages, ring gages, master discs and special gages are mentioned in this new literature folder. It is illustrated and lists the delivery time for the different gages. An internal indicator gage and the "Mikrokator" are included in the folder.

(797) Grinder

The Ingersoll Cutter Grinder. 48 pp. The Ingersoll Milling Machine Company, Rockford, Illinois. Many illustrations are included in this comprehensive booklet which gives a complete discussion of the cutter grinder and the work that it is doing. Such subjects as adjustments and capacity, adapters, clearances, grinder fingers and general grinding practice are discussed.

(798) Brazing

Design of Low Temperature Silver Alloy Brazed Joints. 4 pp. Handy & Harman, 82 Fulton Street, New York City. Numerous line drawings in this new folder show many types of good and poor joints. A few examples of what this concern's Sil-Fos and Easy Flo are doing on war work are included. Formulas are given for different kinds of joints.

(799) Motor Driven Controls

Motor Driven Controls Speed Up Operations. 4 pp. Reynolds Electric Company, 2650 West Congress Street, Chicago. A new line of motor driven controls is described and illustrated in this folder.

NEW BOOKS

Tool Steel Simplified by Frank R. Palmer. 315 pp. $1.00. The Carpenter Steel Company, Reading, Penna. Worthy of comment is the fact that this book is now in its twelfth printing and its distribution has passed the 40,000 mark. The book is said to meet the requirements for an easy to understand text for use in training schools or in the shop for upgrading or trouble shooting.

Profusely illustrated with 205 photographs and line drawings, this book is divided into four main parts. Part I acquaints the reader with tool steel while Part II discusses the proper selection of tool steel for each kind of tool. Part III covers the properties, heat treatment and testing of tool steel. Part IV tells of things worth knowing in respect to tool steels. THE END.

DOUGLAS *Precision* MACHINES

The Douglas Miller combines rigid, well balanced design with convenience of control making it particularly suitable for accurate work in tool room as well as for general production. It is available in plain or universal type.

Showing operation with Universal Milling attachment on tool room job producing a production fixture.

Showing operation with four cutters machining alloy steel for high precision aircraft parts.

Prompt Delivery to War Plants

FOR TOOL ROOM AND PRODUCTION

The Rotorex Universal Tool and Cutter Grinder will accurately perform all kinds of tool grinding operations. Readily interchangeable attachments are available to set up machine for single-purpose jobs such as cylindrical, internal and radius grinding.

Operation showing set-up for internal grinding.

Operation showing set-up for sharpening straight gash hobs.

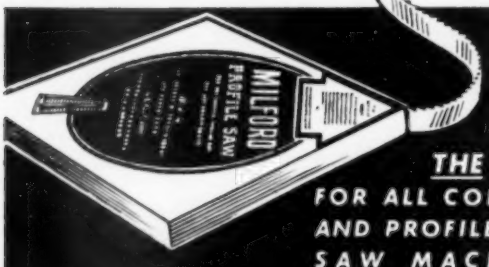
DOUGLAS MACHINERY CO., Inc.

150 BROADWAY • NEW YORK, N. Y.

4309

NOW... MORE PRODUCTION THAN EVER WITH IMPROVED

MILFORD PROFILE SAW



THE BLADE FOR ALL CONTOUR AND PROFILE BAND SAW MACHINES

A new, automatically controlled method of heat treatment, developed and perfected in our own shops, now provides a uniform depth of hardness to every foot of PROFILE SAW. "Etching" tests of sample pieces of each saw guarantee it!

This means uniform cutting and increased production from your contour and band saw machines . . . another reason why it will pay you to specify MILFORD PROFILE SAW by name when ordering.

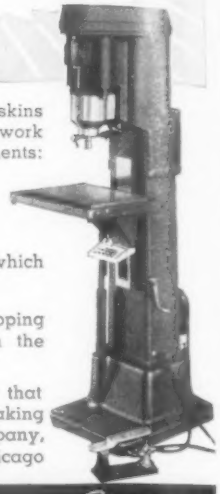
Made and guaranteed by its originators . . . the world's largest producer of metal cutting band saw blades.

Order from your mill supply distributor

. . . If you have not yet adapted your band saw machines to Profile Sawing, write us for directions, giving description of your machines and cutting jobs you have in mind.

THE HENRY G. THOMPSON & SON COMPANY
NEW HAVEN, CONNECTICUT
Also makers of MILFORD REZISTOR HACKSAW BLADES

AMERICA'S MOST ADVANCED TAPPING MACHINE



There's no tolerance problem on Haskins equipment. Absolute uniformity of work results from three Haskins developments:

Air Control which makes precision fit a constant factor, independent of operator efficiency.

Efficiently Engineered Fixtures which greatly simplify the handling of parts.

Piece-Part Control which makes tapping automatic except for placing parts in the fixture.

Send for TAPPING TIPS—new literature that gives many money-saving, money-making ideas. R. G. Haskins Company, 2756 W. Flournoy St., Chicago

HASKINS

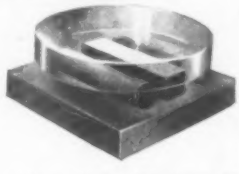
HASKINS *Precision* TAPPING EQUIPMENT

OPTICAL FLATS by *Acme*

for SURFACE INSPECTION
for ACCURATE COMPARISON

★ Acme Optical Flats are finished to a degree comparable to absolute flatness. And, when used to check the *flatness* of a surface, deviations can be quickly detected and accurately measured. Too, they serve as an accurate comparator in connection with your gage blocks as illustrated at right.

Used with the Acme Monochromatic Lamp that provides light of a single wavelength, interference bands appear clear and sharp through the flats.



Above illustration shows an Acme Optical Flat over work and gage for determination of the size of the work.

Complete Details and Prices are yours for the Asking!

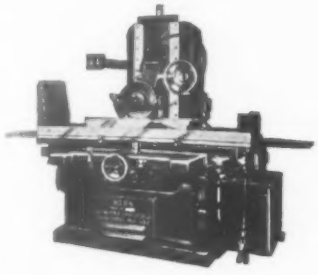
ACME

ACME INDUSTRIAL CO.
Makers of Standardized Jig and Fixture Bushings
Telephone: MONroe 4122
208 N. Laflin St. Chicago, Ill.

SPEED & PRECISION

with

Grand Rapids Hydraulic Feed Surface Grinders



While keeping pace with the Defense Program Grand Rapids Grinders are maintaining the features that have made them one of the leading machine tools of the Nation.

One piece base and column insure accuracy at high speeds attainable on all Grand Rapids Grinders.

Write for Catalog GL-100

GALLMEYER & LIVINGSTON CO.
110 Straight Ave., S. W.
GRAND RAPIDS MICHIGAN

GIRL-POWER

YOUR OPERATIONS WITH MULTIPLE INSTALLATIONS OF GOVRO - NELSON DRILL UNITS

INCREASED-

PRODUCTION RATE
OPERATOR EFFICIENCY
FLOOR SPACE

PROMPT DELIVERIES NOW

HOLE ENGINEERING SERVICE
5901 Fourth Ave. Detroit 2, Mich.

SEND FOR YOUR COPY OF OUR NEW ILLUSTRATED CATALOG GIVING

LATEST *Complete* INFORMATION ON PRECISION GAGES, JIGS, FIXTURES and DIES...

We invite you to have this valuable handbook at your fingertips for ready reference on our entire line of Quality Precision Gages, including details about our **COMPLETE GAGING SYSTEM FOR CARTRIDGE CASE INSPECTION.** We believe you will find this catalog extremely helpful in your endeavor to expedite production of essential war materiel. Fill in the coupon below and . . . MAIL TODAY

QUALITY TOOL & DIE CO.

INDIANAPOLIS, INDIANA

QUALITY TOOL & DIE CO.,
Vermont and N. Noble St., Indianapolis, Ind.

Gentlemen:

Please send me a copy of your new illustrated catalog of Precision Gages, Jigs, Fixtures and Dies—Without obligation to me.

Firm Name.....

Address.....

Your Name..... Title.....

HANDY ANDY

T. M. REG. U. S. PAT. OFF.

Says —

I SEE by the papers where the typists in one of the big plants are in open rebellion against slacks. They came to work in skirts, whereupon they were sent home to "put on some decent clothes". Imagine that!

Well, I'm neutral in that controversy, having long since discovered that women'll wear what they jolly well please. The only way you can get 'em to wear what you want 'em to is to tell 'em they can't. A matter of psychology, like. Personally, though, I can't see that it makes any difference what they wear or don't wear; they're women regardless and possessed of the lure that thrills.

Take sweaters, now, that the movie czars taboo. (Can't take it, them guys). They're supposed to reveal — the sweaters, I mean—but the hitch is that gals without "revealers" pad 'em out the way their grandma's used to pad out the rear bumpers in the bustle days.

A contrary gender, the women. For years they've agitated for the right to wear their pants on the outside, and oh, the fight for equal rights! But now, when nobody cares (much) they're all for skirts again. Yessir, Sherman was right.—It's a h—l of a war — of clothes.

▲ ▲ ▲

A reader called me up anent something I wrote in the last Handy Andy (Okay, Ol' Timer; I merely expressed my sentiments). That disposed of, he went on to say that post-war homes should have offices and efficiency systems to take care of all the forms we have to fill out and so on. Well, we'll need more than that if it keeps on, although I hope that when this fracas is over the OPA and all the rest of the alphabet soup will be dumped down the drain. Not but what it would be oke if it worked, but it seems to me that the more of regulation the screwier it gets.

F'rinstance, OPA announces a rollback in food prices and next day the grocers charge you more for less. It's all geared in reverse; they put the ceiling where the basement ought to be.

Then, Harold Ickes threatens further bans on driving when, as a matter of fact, the buses and rail cars can't take care of present transportation. At that, I'll swear that 90% of drivers are complying with the spirit of rationing. I know that I am.

On top of it all, the Post Office has started a zoning system, ostensibly to speed mail service. But, whoever conceived that brilliant (?) idea entirely overlooked the fact that for every green mail clerk or carrier convenienced by the change a dozen or more people will have to work to revise stationery, mailing lists and so on. The cost will be staggering and the wastage terrific. At any other time the zoning system would be fine, but right now it only adds chaos to confusion.

I sometimes wonder if politicians ever think.

▲ ▲ ▲

Speaking of post-war, did you ever stop to think that **The Tool Engineer** was among the first to propose plans for post-war reconstruction? Perhaps we were too far ahead, but be that as it may America has caught up with us; now, post-war planning is a burning issue only second to winning the war. We should have been there too, Sharley!

It may not be too late to get on the band wagon, and certainly a world shaped by engineers would be preferable to one thrown askew by the bureaucrats and politicians.

No, I'm not peddling any sour grapes; the thing is real, and vital, yet boils down to the simple precept that there can be no depressions as long as there is mass employment. And the only gainful employment that a nation can prosper by must first be engineered. What are **we** going to do about it?

▲ ▲ ▲

At long last, as ex-king Ned said, I got around to visiting Al Sargent's Pioneer futurama. And it's really something to see!

No, I'll not describe it — that's been done — but what impressed me was Al's office. I expected to see leathered

(Concluded on page 198)

CIRCLE "R" METAL CUTTING SAWS

NO WONDER THEY'RE GOOD

This company has been making circular metal cutting saws since 1923, when it was founded, and all its officers and employees were experienced saw makers for a long time before that. Almost all of our factory space, 20,000 square feet, is devoted to this one product.

So it is a fair assumption that we "know" circular saws. In fact we *have* to, because our reputation depends chiefly on this one product. No wonder circle "R" saws are good!

Have you tried them? If not, send for our Catalog K.

PRECISION CONTROL

of manufacturing is another reason why Circle "R" saws are good. Our modern heat treating ovens have potentiometric control, — the most accurate method for the purpose.

CIRCULAR TOOL CO., INC.

PERFECTIONISTS IN TOOL MANUFACTURING

PROVIDENCE, RHODE ISLAND

CHICAGO • PHILADELPHIA • NEW YORK • DAYTON • CLEVELAND

SYRACUSE • INDIANAPOLIS • DETROIT • ST. LOUIS

R

IT'S THE *Finish*

That Provides the

LONGER ACCURATE LIFE of LINCOLN PARK GAGES

IN ANY GAGE, surface finish is of vital importance. Without the extremely smooth surfaces characteristic of the best gages, sliding friction produced with gage use soon wears away the microscopic irregularities which project from the solid metal. This wear soon results in a change in gage size, and the gage is of no further use for its particular inspection purpose.

At Lincoln Park, careful control in grinding and lapping produces gages with extremely high finish. A large department, operated under ideal working conditions and staffed with highly skilled men and women, is devoted to lapping operations alone. Here Lincoln Park Class XX and X gages are finished with Profilometer readings no greater than 1.5 microinches. Readings no greater than 2.5 microinches are guaranteed on Class Y gages.

Lincoln Park Finishes Measured in FRACTIONS of A Microinch

No smaller measurements can be made of surface roughness than those which are secured in the Lincoln Park plant. In constant use is a special Profilometer which incorporates an extra step in its range of sensitivity. It is adapted to the measurement of surfaces three times as smooth as those which can be measured by the standard instrument. Many of the finishes produced by Lincoln Park require this extremely accurate inspection.

ARMY (E) NAVY

LINCOLN PARK TOOL and GAGE CO.

LINCOLN PARK, MICHIGAN

(Concluded from page 196)

divans and mahogany desks like the way some of these Radio Center tycoons deck out their offices, but nothing like that.

Instead, Al works with his gang, hasn't changed a bit since the days he plugged away as Secretary for A.S.T.E. He has succeeded because he has given service, and that is the only excuse for being in business, be it consulting engineering or making shoestrings. Anyway, I think that Al will be glad to see his friends; he's that kind of a guy.

▲ ▲ ▲

You know, a thing succeeds because somebody behind it wants it to succeed, gives it everything he's got.

The A.S.T.E. grew that way, because men with a will to succeed got behind it. Yet, it is an axiom that in any organization a minority does most of the work. Not that many aren't willing, and only wait their turn to serve, but, it takes more than willingness alone. There's got to be aptitude, and a liking for the job assigned. And, there's got to be time.

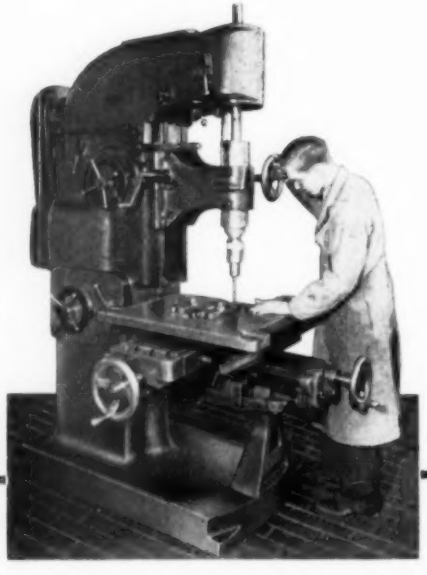
For example, a man may be elected a director, and he may be extremely capable — outstanding, for that matter — but if he hasn't the time to serve he just has to work by proxy.

I'm thinking of our various past presidents and officers, as Bill Smila, Joe Siegel, Walter Wagner, Al Sargent, etc., who (to use that term) grew up with the Society and who helped further it through its lean years.

These men are not only experienced in Society work, but are genuinely interested in its progress. They should be put to work, would function admirably as directors. This would be no barrier to new blood, since representation would be in the area of the electees. But it would mean experienced guidance for new directors. Think it over.

THE END.

THIS WAR-WORKER HAS A FOUR-FISTED MACHINE



1. Rigidity
2. Accuracy
3. Speed
4. Power

THE KNIGHT MILLER

In the illustration the machine is drilling holes in a large die plate prior to boring. No preliminary layout is necessary because a dial indicator is used to locate holes.

● RIGIDITY, ACCURACY, SPEED, and POWER — all are assured with this universal vertical Knight milling machine. It produces more work, requires less equipment, eliminates hours of layout, and produces quality results. Such features make the Knight Miller a time-saver and a profit-maker.

The construction of the unique table unit, which swivels around the column and tilts either side of horizontal, is just one feature which makes this machine so outstandingly versatile. Without special equipment it can quickly and accurately machine difficult and unusual parts. Write today for complete information on this versatile miller.

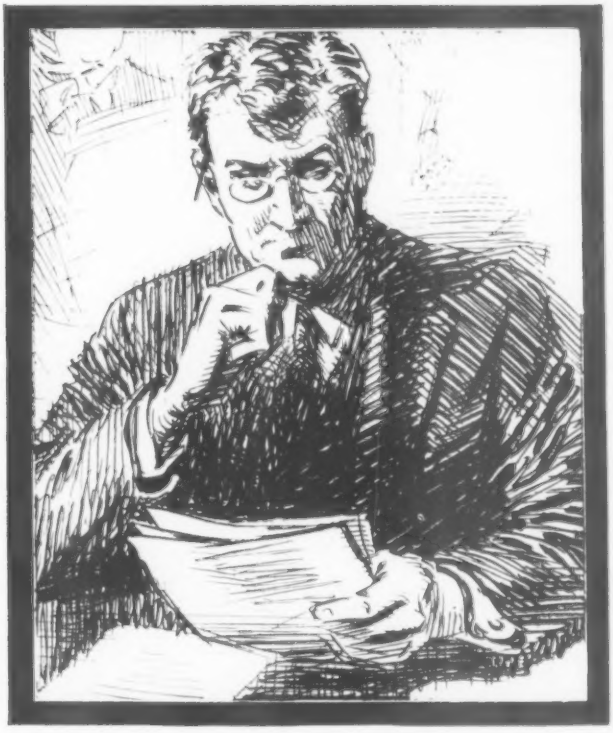
W. B. KNIGHT MACHINERY CO.
3920 WEST PINE
SAINT LOUIS, MO.

36 Years A Builder of Quality Milling Machines

ARMY - NAVY "E" AWARD WINNERS FOR EXCELLENCE IN WAR PRODUCTION

ALLOY STEEL PRODUCTS COMPANY
Linden, New Jersey
BADGER METER MANUFACTURING COMPANY
Milwaukee, Wisconsin
BRIDGEPORT BRASS COMPANY
Indianapolis, Indiana
BUFFALO ARMS CORPORATION
Buffalo, New York
CHAMBERSBURG ENGINEERING COMPANY
Chambersburg, Pennsylvania
CINCINNATI BALL CRANK COMPANY
Cincinnati, Ohio
THE CLEVELAND TRACTOR COMPANY
Cleveland, Ohio
CURTISS-WRIGHT CORPORATION
Beaver, Pennsylvania
DEERE AND COMPANY
Moline, Illinois
THE DEFIANCE AUTOMATIC SCREW CO.
Defiance, Ohio
DELTA FINISHING COMPANY
Philadelphia, Pennsylvania
E. I. DU PONT DE NEMOURS & COMPANY, INC.
Moosic, Pennsylvania
EAGLE PRECISION TOOL & DIE COMPANY
Long Island City, New York
EASTERN TOOL & MANUFACTURING CO.
Bloomfield, New Jersey
ERIE FOUNDRY COMPANY
Erie, Pennsylvania
EVANSVILLE ORDNANCE PLANTS
Chrysler & Sunbeam Divisions,
Evansville, Indiana
FEDERAL CARTRIDGE CORPORATION
Minneapolis, Minnesota
GENERAL MOTORS CORPORATION
Fisher Body Division,
Detroit Aircraft and Fleetwood Units,
Detroit, Michigan
GENERAL MOTORS CORPORATION
Research Laboratories Division,
Detroit, Michigan
THE A. F. HOLDEN COMPANY
New Haven, Connecticut
INTERNATIONAL INDUSTRIES, INC.
Ann Arbor, Michigan
JONES AND LAUGHLIN STEEL CORPORATION
Pittsburgh, Pennsylvania
LEBANON STEEL FOUNDRY
Lebanon, Pennsylvania
LINK-BELT COMPANY
Indianapolis, Indiana
LINK-BELT ORDNANCE COMPANY
Chicago, Illinois
LUFKIN FOUNDRY & MACHINE COMPANY
Lufkin, Texas
NATIONAL MALLEABLE & STEEL CASTINGS CO.
Indianapolis, Indiana
NORTHWESTERN MACHINE CORPORATION
St. Louis, Missouri
PITTSBURGH LECTROMELT FURNACE CORP.
Pittsburgh, Pennsylvania
PITTSBURGH METALLURGICAL COMPANY, INC.
Niagara Falls, New York
QUALITY TOOL & DIE COMPANY
Indianapolis, Indiana
SKILSAW, INCORPORATED
Chicago, Illinois
THE STEWART-WARNER CORPORATION
Chicago, Illinois
THOMSON MACHINE COMPANY
Belleville Plant,
Belleville, New Jersey
UNITED STATES RUBBER COMPANY
Eau Claire, Wisconsin
WALD MANUFACTURING COMPANY, INC.
Maysville, Kentucky
WESTERN MACHINE TOOL COMPANY
Holland, Michigan
WESTINGHOUSE ELECTRIC & MFG. CO.
Mansfield, Ohio
WORCESTER MOULDED PLASTICS COMPANY
Worcester, Massachusetts
WORCESTER PRESSED STEEL COMPANY
Worcester, Massachusetts
ZIMMERMAN STEEL CASTING COMPANY
Bettendorf, Iowa

DON'T WORRY



IF IT IS NECESSARY TO USE SPECIAL TOOLING

An easy question for a man with many years' experience!

He knows the answer to many tool problems. He knows that a converted standard tool is the only tool for certain types of jobs. He also knows that tools that have about 2/3rds of their cutting edge gone can be recut to another design to do special jobs. This type of man can keep tool costs down to a minimum.

But, if you have never had any special jobs before—all this might never occur to you. — That's where we come in. We know quite a bit about what tools can do and must do under many situations.

We also know quite a bit about converting standard tools quickly to meet odd specifications, because, we've been converting hundreds of tools every day.

Why not put your problem up to us? Maybe we'll have to develop it. Maybe we'll give you the answer in a jiffy and save you many hours of worry and loss of production.

In any case, we freely offer our 30 years experience, recutting high speed tools without annealing, converting new standard tools to specials, plus plenty of resourceful thinking.

★ *BUY MORE WAR BONDS!* ★

A COMPLETE RECONDITIONING SERVICE FOR TOOLS

NEW MILLING CUTTERS FROM OUR STOCK OR YOUR OWN STANDARD CUTTERS CAN BE QUICKLY CONVERTED TO SPECIAL CUTTERS

EASTERN CUTTER CORPORATION 30-32 Littleton Ave., Newark, N. J.

Chrome Plant **MASTER CHROME SERVICE** INC., 5709 Herman Ave., N. W., Cleveland, Ohio

FOR ECONOMICAL PRODUCTION

When close tolerances are required, use AMCO Spline Gages, Arbors and Master rolling Gears.

OUR PRODUCTS

Straight Side, Serration, Involute Male and Female Splined Gages, Plug, Ring, Snap, Flush Pin, Profile, Fixture, Length, Width, Thickness and Relation Gages. We have a complete Spline Engineering Service for your convenience. Gages with close tolerances are normalized and stabilized. All gages are inspected at 68° Fahrenheit. May we quote on your requirements?

AMCO GAGE COMPANY

19760 West Eight Mile Road — Detroit, Michigan

Diamond Tool Economy

WITH

ADAMANT DIAMOND WHEEL DRESSING TOOLS

•

No more lost or missing diamonds from settings with Adamant diamond tools. The entire diamond may be consumed without resetting. 20 years of engineering experience is behind each tool. Adamant uniquely set highest quality tools will bring you a big saving over your present diamond tool costs. QUICK DELIVERIES. Inquiries invited. Send blueprints, specifications of your requirements to—

Adamant Tool Company

MIDWEST SALES OFFICE
209 S. STATE ST., CHICAGO, ILL.
PHONE HARrison - 8173

FACTORY
657 Bloomfield Ave., Bloomfield, N. J.

C-F POSITIONERS

help build ships for Victory

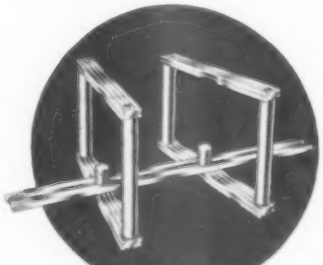
Welding has become a quantity production operation with C-F POSITIONERS because the welders themselves can now position giant weldments without a crane or sling crew. On the giant turbine gear blank shown the welder welds all sides and internal angles downhand — just pushes buttons to tilt the blank up to 135° beyond horizontal or rotate it 360°, under variable speed control to make the endless peripheral welds. So it is thruout many shipyards, welders with C-F POSITIONERS are building parts and sub-assemblies which would require many more hours of labor, highly skilled men and machine tools to produce by other methods.

Write for Bulletin WP 22.

CULLEN-FRIESTEDT CO.,
1310 S. KILBOURN AVE. CHICAGO, ILLINOIS

Safe, Adjustable PARALLELS

That Speed Precision Operations...!



★Get rid of the obsolete, dangerous method of slowly building a foundation for drilling, tapping, boring, milling, grinding and other precision operations.

Do it the war-time way . . . the safe and speedy way . . . with Acro *adjustable* PARALLELS. They are made in three sizes and handle a wide range of work.

USED IN AMERICA'S BIG WAR PLANTS

These modern PARALLELS have become standard equipment in many of America's leading war plants . . . your assurance that PARALLELS by Acro will do much toward speeding precision operations in your plant. Act now!

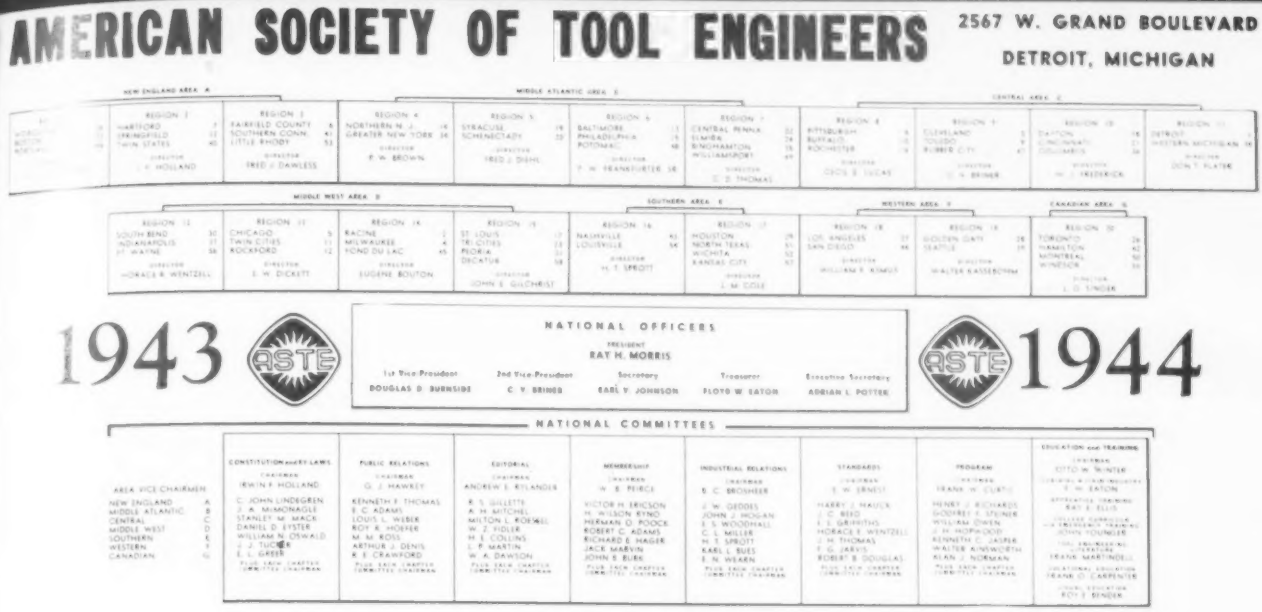
See Your Jobber or Write Direct!

ACRO TOOL & DIE WORKS

5329 N. Kedzie Ave. Chicago, Ill.
IRVing 8500
Precision Machinists • Tools • Dies • Metal Specialties

AMERICAN SOCIETY OF TOOL ENGINEERS

2567 W. GRAND BOULEVARD
DETROIT, MICHIGAN



1943 1944

NATIONAL OFFICERS

PRESIDENT
RAY H. MORRIS

1st Vice-President	2nd Vice-President	Secretary	Treasurer	Executive Secretary
DOUGLAS D. BURNSIDE	C. V. BRIMER	EARL V. JOHNSON	FLOYD W. EATON	ADRIAN L. POTTER

NATIONAL COMMITTEES

AREA VICE-CHAIRMEN

NEW ENGLAND	A
MIDDLE ATLANTIC	B
CENTRAL	C
MIDDLE WEST	D
SOUTHERN	E
WESTERN	F
CANADIAN	G

CONSTITUTION AND BY-LAWS — CHAIRMAN: IRWIN F. HOLLAND
C. JOHN LINDEGREN, J. A. McMONAGLE, STANLEY M. MACK, DANIEL D. EYSTER, WILLIAM N. OSWALD, C. J. TUCKER, E. L. GREER
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

PUBLIC RELATIONS — CHAIRMAN: G. J. HAWKEY
KENNETH F. THOMAS, E. C. ADAMS, LOUIS L. WEBER, ROY R. HOEFER, M. M. ROSS, ARTHUR J. DENIS, R. L. CRAWFORD
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

EDITORIAL — CHAIRMAN: ANDREW E. RYLANDER
R. S. GILLETTE, A. H. MITCHEL, MILTON L. ROESSEL, W. Z. FIDLER, H. E. COLLINS, L. P. MARTIN, W. A. DAWSON
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

MEMBERSHIP — CHAIRMAN: W. E. PEIRCE
VICTOR H. ERICSON, H. WILSON RYNO, HERMAN O. POOCK, ROBERT C. ADAMS, RICHARD E. HAGER, JACK MARVIN, JOHN S. BURK
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

INDUSTRIAL RELATIONS — CHAIRMAN: B. C. BROSHEER
J. W. GEDDES, JOHN J. HOGAN, E. S. WOODHALL, C. L. MILLER, H. T. SPROTT, KARL L. BUES, F. N. WEAKEN
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

STANDARDS — CHAIRMAN: E. W. ERNST
HARRY J. HAUCK, J. C. REID, F. D. GRIFFITHS, HORACE E. WENTZELL, J. H. THOMAS, F. G. JARVIS, ROBERT B. DOUGLAS
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

PROGRAM — CHAIRMAN: FRANK M. CURTIS
HENRY J. RICHARDS, GODFREY E. STEINER, WILLIAM OWEN, J. H. HOPWOOD, KENNETH C. CASPER, WALTER A. WENTWORTH, ALAN J. NORMAN
PLUS EACH CHAPTER COMMITTEE CHAIRMAN

EDUCATION AND TRAINING — CHAIRMAN: OTTO W. WINTER
VOCATIONAL AND APPRENTICE TRAINING: RAY E. ELLIS
COLLEGE CURRICULA AND EMERGENCY TRAINING: JOHN YOUNGER
TOOL ENGINEERING TEXTBOOKS: FRANK MARTINDELL
NATIONAL EDUCATIONAL EXHIBIT: FRANK O. CARPENTER
NATIONAL EDUCATIONAL CONFERENCE: ROY J. BENDER

ADDRESSES OF OFFICERS, DIRECTORS AND NATIONAL COMMITTEEMEN APPEARING IN ABOVE CHART

ADAMS, E. C.—4508 Burlington Pl., N. W., Washington, D. C.
ADAMS, ROBERT C.—1702 W. Washington St., South Bend, Ind.
AINSWORTH, WALTER—145 S. Lafayette, Bremerton, Wash.
ASMUS, WILLIAM F.—2905 Bancroft St., San Diego, Calif.
BENDER, ROY E.—304 Groveland Club, Cleveland, Ohio.
BOUTON, EUGENE—1742 N. Prospect Ave., Milwaukee, Wisconsin.
BRINER, C. V.—930 E. 70th St., Cleveland, Ohio.
BROSHEER, B. C.—816 Howard St., Wheaton, Ill.
BROWN, P. W.—433 Hillcrest Ave., Ridgewood, N. J.
BUES, KARL L.—4267 Detroit Ave., Oakland, Calif.
BURK, JOHN B.—401 Fleet St., W., Toronto, Ont., Canada.
BURNSIDE, D. D.—2001 S. Kings Highway Blvd., St. Louis, Mo.
CARPENTER, FRANK O. — Training Within Industry Div., WMC, 15 Boulevard Bldg., Detroit, Mich.
COLE, L. M.—409 Velasco St., Houston, Tex.
COLLINS, H. E.—6666 Park Lane, Houston, Tex.
CRAWFORD, R. E.—384 Durie St., Toronto, Ont., Canada.
CURTIS, FRANK W. — c/o Van Norman Machine Tool Co., Springfield, Mass.
DAWLESS, FRED J.—131 Park St., New Haven, Conn.
DAWSON, WILLIAM A. — c/o Otis-Fensom Elevator Co., Ltd., Hamilton, Ont., Canada.
DENIS, ARTHUR J.—1305E N. Harper Ave., Hollywood, Calif.
DICKETT, E. W.—625 N. Court St., Rockford, Ill.
DIEHL, Fred J.—c/o General Electric Co., Bldg. 56, Room 601, Schenectady, N. Y.
DOUGLAS, ROBERT B.—c/o Canadian Car & Foundry Co., Propeller Div., Montreal, Que., Canada.
EATON, F. W.—926 Penrose Ave., Detroit, Mich.
ELLIS, RAY—1448 Myron St., Schenectady, N. Y.
ERICSON, VICTOR H. — 46 Gifford Drive, Worcester, Mass.
ERNEST, E. W.—General Electric Co., Bldg. 19, Schenectady, N. Y.
EYSTER, DANIEL D. — 4941 N. Ardmore, Milwaukee, Wis.
FIDLER, W. Z.—501 38th St., Rock Island, Ill.
FLATER, DON T.—341 Massachusetts Ave., Highland Park, Mich.
FRANKFURTER, PAUL W., SR.—4623 Morris St., Gtn., Philadelphia, Penna.
FREDERICK, W. J.—4758 Spring Grove Ave., Cincinnati, Ohio
GEDDES, J. W.—c/o H. K. Porter Co., Inc., Everett, Mass.
GILCHRIST, JOHN E.—28 Grand View Dr., Collinsville, Ill.
GILLETTE, R. S. — 77 Summer St., Springfield, Vt.
GREER, E. L.—7 Hughson St., S., Hamilton, Ont., Canada.
GRIFFITHS, E. E.—c/o Westinghouse Electric & Mfg. Co., Time Study and Methods, East Pittsburgh, Penna.
HAGER, RICHARD E.—2831 Duval Dr., Dallas, Tex.
HAUCK, HARRY J.—22 N. Wellington St., New Britain, Conn.
HAWKEY, G. J. — 626 Penton Bldg., Cleveland, Ohio.
HOEFER, ROY R. — 1144 Washington Blvd., Chicago, Ill.
HOGAN, JOHN J.—c/o Otis Elevator Co., Yonkers, N. Y.
HOLLAND, I. F.—c/o Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn.
HOPWOOD, J. H.—3606 Parker Ave., Indianapolis, Ind.
JARVIS, F. G.—460 Veteran Ave., Westwood Village, Los Angeles, Calif.
JASPER, KENNETH C.—4305 S. 2nd Ave., Louisville, Ky.
JOHNSON, EARL V. — 1203 Patterson Road, Dayton, Ohio.
KASSEBOHM, WALTER—940 Dwight Way, Berkeley, Calif.
LINDEGREN, C. J.—93 Grand St., Worcester, Mass.
LUCAS, CECIL E. — 55 Flint St., Rochester, N. Y.
MACK, STANLEY M.—1115 Oakwood Ave., Columbus, Ohio.
MARTIN, L. P.—39 Marguerite Drive, Oakland, Calif.
MARTINDELL, FRANK — 4615 Wolf Road, Western Springs, Ill.
MARVIN, JACK — 2572 Ohio Ave., South Gate, Calif.
McMONAGLE, JOHN A.—1007 Serrill Ave., Yeadon, Penna.
MILLER, C. L.—4245 Forest Park Ave., St. Louis, Mo.
MITCHEL, A. H. — 226 Paul Ave., Syracuse, N. Y.
MORRIS, RAY H.—7 S. Main St., W. Hartford, Conn.
NORMAN, ALAN J.—R. R. No. 1, River Canard, Ont., Canada.
OSWALD, WILLIAM N.—2318 Barberry St., Dallas, Tex.
OWEN, WILLIAM — c/o Pittsburgh Plate Glass Co., 2300 Grant Bldg., Pittsburgh, Penna.
PEIRCE, W. B.—c/o Flannery Bolt Co., Bridgeville, Penna.
POOCK, HERMAN O.—c/o The Inland Mfg. Div., GMC, Dayton, Ohio.
POTTER, ADRIAN L. — American Society of Tool Engineers, 2567 W. Grand Blvd., Detroit, Mich.
REED, J. C.—3303 Commonwealth Ave., Alexandria, Va.
RICHARDS, HENRY J. — c/o Everett Supercharger Plant, G. E. Co., Everett, Mass.
ROESSEL, MILTON L. — 97 Biltmore Dr., Rochester, N. Y.
ROSS, M. M.—631 N. Bluff, Wichita, Kan.
RYLANDER, ANDREW E.—c/o Bramson Publishing Co., 2842 W. Grand Blvd., Detroit, Mich.
RYNO, H. WILSON—1060 Broad St., Newark, N. J.
SINGER, L. G.—11 Front St., E., Toronto, Ont., Canada.
SPROTT, H. T. — 932 Silveroene Pl., Nashville, Tenn.
STEINER, GODFREY F.—5404 Hamlet Ave., Baltimore, Md.
THOMAS, C. D.—730 Riverside Ave., Elmira, N. Y.
THOMAS, JOHN H.—c/o Westinghouse Electric & Mfg. Co., P. O. Box 1860, Louiville, Ky.
THOMAS, KENNETH F.—211-212 Capitol Bldg., Hartford, Conn.
Tucker, J. J.—3536 Copley Ave., San Diego, Calif.
WEARN, E. N.—19 Bowie Ave., Toronto, Ont., Canada.
WEBER, LOUIS L. — 3055 Colerain Ave., Cincinnati, Ohio
WENTZELL, HORACE R. — 1702 W. Washington Ave., South Bend, Ind.
WINTER, OTTO W.—551 Pilgrim Rd., Birmingham, Mich.
WOODHALL, E. S.—c/o Goodyear Aircraft Corp., Akron, Ohio.
YOUNGER, JOHN—Prof. of Ind. Eng., Ohio State University, Columbus, Ohio.

CHAPTER CHAIRMEN AND SECRETARIES — 1943 - 1944

(AKRON) RUBBER CITY: P. C. Guntrup, Chmn.; Paul L. Passmore, Sec., 1111 Oakland Ave.
BALTIMORE: Charles W. Moyer, Chmn., Howard C. Noll, Sec., 69 Burkshire Rd., Towson, Md.
BINGHAMTON: Arthur L. Becker, Chmn.; A. J. Pangburn, Sec., 556 Hooper Rd., Johnson City, N. Y.
BOSTON: Warren Ames, Chmn.; Ernest E. Vansaw, Sec., 98 Highland Ave., Wellaston, Mass.
BUFFALO - NIAGARA FRONTIER: Frank M. Wilson, Chmn.; Frank S. McCoy, Sec., c/o R. C. Neal Co., Inc., 76 Pearl St., Buffalo N. Y.
CHICAGO: Frank Martindell, Chmn.; Fred J. Schmitt, Sec., c/o D. A. Stuart Oil Co., 2727 S. Troy St.
CINCINNATI: Carl N. Flick, Chmn.; C. W. Stricker, Sec., 3446 Burch Ave.
CLEVELAND: William Reiff, Jr., Chmn.; R. H. Alexander, Sec., c/o Electro Metals, Inc., 2010 E. 71st St.
COLUMBUS: S. J. Matchett, Jr., Chmn.; C. W. Warner, Sec., c/o Columbus Bolt Works Co., 291 Marconi Blvd.
(DALLAS) NORTH TEXAS: Irving Buck, Chmn.; A. T. Chamberlain, Sec., c/o The Cleveland Pneumatic Tool Co., 3200 Main St.
DAYTON: J. D. Blair, Chmn.; George H. Bollman, Sec., 205 Perrine St.
DECATUR: Edward M. Barry, Chmn.; Roy Dunn, Sec., 1673 W. Forest St.
DETROIT: George H. Whitehouse, Chmn.; Ray H. Farmer, Sec., 4815 Fernwood Ave.
ELMIRA: Dolph Kylor, Chmn.; Karl C. Schmedicke, Sec., 1075 Richard St.
FAIRFIELD COUNTY (BRIDGEPORT, CONN.): Oscar W. Cooper, Chmn.; Ernest Reany, Sec., 4709 N. Main St., Stratford, Conn.
FOND DU LAC: Arthur F. Schroeder, Chmn.; Henry S. Faith, Sec., 69 S. Marr St.
FORT WAYNE: Cyril Grindrod, Chmn.; Milton Kline, Sec., 4315 S. Fairfield, Fort Wayne, Ind.
(GRAND RAPIDS) WESTERN MICHIGAN: George H. Hoogerhyde, Chmn.; Theodore S. Vanderveen, Sec., 263 Bel-Air Drive N. E.
GREATER NEW YORK: W. Cortlyn Rhodes, Jr., Chmn.; Harry W. Fink, Sec., 1176 Walton Ave., N. Y. C.
HAMILTON, ONTARIO: Joseph Little, Chmn.; Kenneth R. Laidley, Sec., c/o Canadian General Electric Co., Ltd., 27-29 John St., S.
HARTFORD: Carl W. Moeller, Chmn.; Richard A. Smith, Sec., 9 Court Park, W. Hartford, Conn.
HOUSTON: Chris Vogt, Chmn.; Mike D. Carleton, Sec., 8136 Concord St.
INDIANAPOLIS: Hayden R. Shearer, Chmn.; R. S. Hittle, Sec., 2122 Northwestern Ave.
KANSAS CITY: W. W. Mason, Chmn.; W. H. Lebo, Sec., 7500 E. 10th St., Kansas City, Mo.
LOS ANGELES: Arthur J. Denis, Chmn. William C. Surwill, Sec., 1605 N. Evergreen Ave., Burbank, Calif.
LOUISVILLE: Frederick Brown, Chmn.; Charles D. Hargadon, Sec., 4031 Hycliffe Ave.
MILWAUKEE: Paul O. Wernicke, Chmn.; Ernst L. Collin, Sec., R. R. No. 2, Fairy Chasm, Thiensville, Wis.
(MINNEAPOLIS - ST. PAUL) TWIN CITIES: Francis E. Gruber, Chmn.; W. H. Erskine, Sec., 2371 Chilcombe, St. Paul, Minn.
(MOLINE) TRI-CITIES: Fred Siebenmann, Chmn.; Herbert M. Nelson, Sec., Deere & Mansur Works, Moline, Ill.
MONTREAL: R. B. Douglas, Chmn.; Herbert E. Gibson, Sec., Apt. 1, 3800 Cote, St. Catherine Rd., Montreal, Que., Canada.
NASHVILLE: John L. Blume, Chmn.; William S. Taylor, Sec., 507 E. Iris Dr.
NEW HAVEN: Fred J. Dawless, Chmn.; M. J. Weldon, Sec., c/o Henry G. Thompson & Son Co.
NORTHERN NEW JERSEY: Horace E. Linsley, Chmn.; H. Wilson Ryno, Sec., 1060 Broad St., Newark, N. J.
PEORIA: Van Wilder Joslin, Chmn.; Herman J. Krei, Sec., 438 Stanley Ave.
PHILADELPHIA: Foster M. Crayton, Chmn.; W. Warren Cady, Sec., 6310 Sherwood Rd., Overbrook, Philadelphia, Pa.
PITTSBURGH: Gardner Young, Chmn.; Gus L. Kronfeld, Sec., 1609 Investment Bldg.
PORTLAND, MAINE: R. E. Goldsmith, Chmn.; Calvin L. Fickett, Sec., 235 Ocean Ave.
(PROVIDENCE) LITTLE RHODY: Philip S. Huntley, Chmn., Earl R. Phinney, Sec., 12 Allen Ave., Pawtucket, R. I.
RACINE: William Davidson, Chmn.; Stanley R. Willing, Sec., 1227 Monroe Ave.
ROCHESTER: Joseph H. Schick, Chmn.; Milton L. Roessel, Sec., 97 Biltmore Dr.
ROCKFORD: Leo W. Reuland, Chmn.; Ernst A. Norrman, Sec., 1213 Revell Ave.
SAN DIEGO: J. Grant Cline, Chmn.; C. L. Bland, Sec., 3362 N. Mountain View Dr.
(SAN FRANCISCO) GOLDEN GATE: Walter Kassebohm, Chmn.; Karl L. Bues, Sec., 4267 Detroit Ave., Oakland, Calif.
SCHENECTADY: W. A. Nelson, Chmn.; Nelson Y. Coxe, Sec., Planning & Wage Rate Dept., Bldg. 41, Room 235 General Electric Co.
SEATTLE: John H. Metcalf, Chmn.; Sterling M. Clark, Sec., 2102 1st St. W.
SOUTH BEND: Frank Foote, Chmn.; Fred S. Burnside, Sec., c/o Martin Machine Co., Inc.
SPRINGFIELD, MASS.: Carl Rising, Chmn.; Wendell T. Ingham, Sec., c/o National Blank Book Co., Holyoke, Mass.
(SPRINGFIELD, VT.) TWIN STATES: Ernest V. Flanders, Chmn.; Ray N. Streeter, Sec., c/o Jones & Lamson Machine Co., Clinton St.
ST. LOUIS: Ernst H. Nieman, Chmn.; Otto C. Deubel, Sec., c/o Carter Carburetor Corp., 2840 N. Spring Ave.
SYRACUSE: Stephen Urban, Chmn.; Ray D. Coseo, Sec., 239 Maplehurst Ave.
TOLEDO: Claude E. Robitaille, Chmn.; Chester A. Colwell, Sec., 2903 Inwood Dr.
TORONTO: F. Schytte, Chmn.; J. B. Burk, Sec., c/o Atlas Steels Ltd., 401 Fleet St., W. Toronto, Ont., Canada.
(WASHINGTON, D. C.) POTOMAC: Ernest M. Seifert, Chmn.; Edward A. Peterson, Sec., 1618 22nd St., S. E.
WICHITA: M. M. Ross, Chmn.; William F. Grabendike, Sec., 412 S. Clifton.
WILLIAMSPORT: Harry S. Taylor, Chmn.; William J. McCoy, Sec., 906 Louisa.
WINDSOR: Alan J. Norman, Chmn.; David M. Duncan, Sec., c/o F. F. Barber Machinery Co., 1922 Wyandotte St., E., Windsor, Ont., Can.
WORCESTER: Henry W. Wilder, Chmn.; Harvey M. Allison, Sec., 7 Plantation St.
(YORK) CENTRAL PENNSYLVANIA: Ivan E. Grass, Chmn.; Herbert M. Boyer, Sec., 427 Tioga St.

• For application blanks and information pertaining to membership in the American Society of Tool Engineers, address the Secretary's office, 2567 W. Grand Boulevard, Detroit, Michigan. Telephone: TY 50145.

• Senior initiation fee is five dollars. Dues eight dollars per year for senior grade membership and five dollars per year for junior grade membership. Junior initiation fee is two dollars.

A. S. T. E. DOINGS

Binghamton: Meeting June 2, in the Sherwood Hotel, Green, New York, 96 members and guests heard H. M. Kuffman, Field Engineer, Cincinnati Milling Machine Company, discuss "Correct Cutter Sharpening and Design". Samuel Lenox received a Past Chairman pin. The presentation was made by A. F. Becker, Chairman.

Buffalo: Paul Bartram, Army Air Corps, Buffalo office, made a plea for excess or idle tools of all types at a meeting of the chapter May 20, at the Lafayette Hotel. After Mr. Bartram had discussed material re-distribution and the need for lists of available tools, Frank O. Hoagland, Master Mechanic, Pratt & Whitney Division, Niles-Bement Pond Company, spoke on jig boring and related problems. His talk was illustrated with slides. Highlight of the meeting was Chairman Frank M. Wilson's recognition of the recent death of Michael J. Grass, well-liked member.

STURTEVANT
QUALITY
Help make U.S. Aircraft Engines the WORLD'S finest
STURTEVANT
TORQUE WRENCHES
Protect...
STURTEVANT TORQUE WRENCHES protect the performance and life of most U.S. Aircraft engines—not only travel with them in the tool boxes but are used to control the torques applied in their manufacture.
They are used to—assure the uniform "set" on vital screws that prevents uneven strains and warping, to gauge the set of spark plugs, to measure frictional drag, etc. Coming in sizes to accurately measure torque from 0 to 7200 inch pounds, they eliminate guesswork and haphazard tightening. They are introducing new accuracy in the manufacture of even the most delicate instruments . . . are provided in husky giant sizes for the heaviest work.
Products of STURTEVANT, pioneer designare permanently accurate and have wrenches, they have the flat beam which eliminates all springs, adjustments and fragile mechanisms or moving parts. They are permanently accurate and have double dials that can be read from all working angles.
NO
FRICTION
ADJUSTMENTS
MOVING PARTS
FRAGILE
MECHANISMS
CAPACITIES
from
0 to 7200
inch pounds
P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Columbus: Early and modern methods of file steel manufacture and the selection and application of special purpose files were subjects of photographic slides and motion pictures presented by Walter R. Buerckel, Nicholson File Company, at the June 8 meeting, Hotel Fort Hayes. Earl Johnson, National Secretary, presented Chapter Chairman S. J. Matchett with a Chairman's pin and discussed Society educational projects.

Dallas: At a business meeting in the Jefferson Hotel, May 7, five new committee appointments were made: LeRoy McDill, Chairman, Standards; Walter Frazier and Walter Theis, Chairman and Co-Chairman respectively, Industrial Relations; Fred Bates, Program; W. D. Poteet, to assist Co-Chairman Claude Wilson, Publicity.

Dayton: Meeting in joint session with the American Society for Metals June 14, the Ohio chapter heard a lecture and clinic on tool steels, presented by Howard J. Stagg, Sales Metallurgical Engineer, Crucible Steel Company.

The initial appearance of the Dayton chapter's Year Book, produced by Ralph Lilleberg, Ora Peters and John Meyer, enjoyed a spontaneous and enthusiastic reception by members. Forty new members were accepted during the past month and applications for 10 memberships were received at the last meeting. This month's meeting will be held at the Inland Gun Club. Fish and "refreshments" are inducements.

Decatur: Technical data on correct cutter grinding practice and techniques were discussed by H. M. Huffman, Research and Development Engineer, Cincinnati Milling Machine Company, June 9, at the Orlando Hotel. Mr. Huffman was introduced by Edwin W. Brown, Assistant Training Manager, Caterpillar Military Engine Company. Attendance at the meeting was 243.

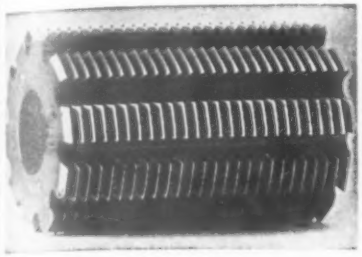
Detroit: The Rackham Memorial Auditorium was filled as First Vice-Chairman Wilcox reversed usual procedure by introducing the audience to the speaker, Col. H. W. Miller, University of Michigan. His talk, "The Shape of Things to Come in World War II", ran the gamut of human behavior from remote antiquity to the present. While philosophic and academic, the subject was admirably treated and held the audience enthralled. A technical movie, "The Testing of High Speed Steel Tools", by Timken Roller Bearing Company, and war pictures of Tunisia and Stalingrad, completed the program.

Fond Du Lac: Sheboygan Night was

(Continued on page 204)

THREAD MILLING HOBS & COMBINATION CUTTERS

Class 1 or 2 or 3 fit in any thread system and thread angle



Shell hobs up to 7" O.D. and 5" width Taper shank hobs to 12" overall length.

On orders more than 25 hobs—1st shipment within ten days.

U. S. MACHINE TOOL MFG. CORPORATION

Phone 85 Clinton, Indiana

ATTENTION!

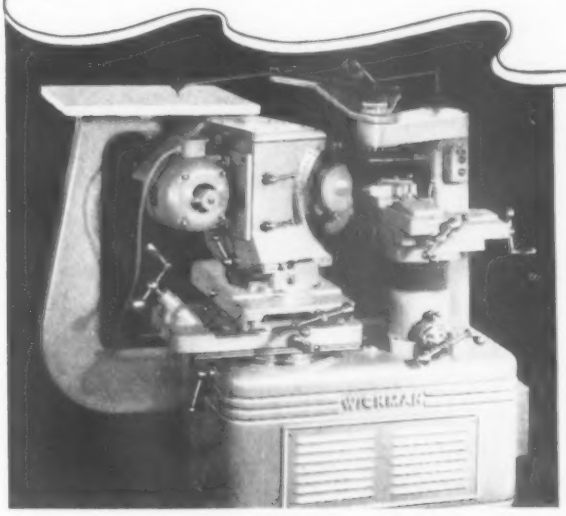
TOOL & DIE MAKERS—SHEET METAL MEN —PATTERN MAKERS—MACHINISTS, ETC.

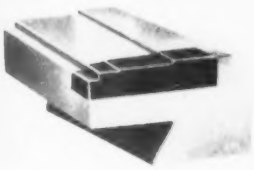
Speeds layout time on brass, aluminum, copper, tin, stainless steel. Oil Resistant. Won't chip, crack, or flake off. Also ideal as a marking dye for easy identification of metals. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals.

Send for Your FREE SAMPLE Today!

TAMMS SILICA CO.,
228-T North LaSalle St.
Chicago, Ill.

Grinds Profiles Such as These





TUNGSTEN CARBIDE TIPPED FORM TOOL

Width of Carbide Tip . . 1½"
Depth of Cut . . . . . .120"
Stock removed — approx. .040"
Grinding time . . . . . 2 hrs.

In TUNGSTEN-CARBIDE or OTHER HARD METALS *Directly From The Drawing*

Each of the parts illustrated at the right were ground on the Wickman Profile Grinder without the use of a radius dresser or formed wheel. Any other desired regular or irregular shape within the range of the machine can also be finish ground.

HARDENED STEEL CONTOUR GAGES

Width of pieces . . . . . 3½"
Depth of cut . . . . . ½"
Stock removed — approx. .032"
Sixteen pieces stacked and ground in one time, in 3½ hours or 14 minutes per gage.

The Wickman Profile Grinder is actually a combination of a universal grinder and a microscopic inspection device. It employs a paper and pencil layout 50 times the size of the profile to be ground and a 30 power microscope. The long arm of the pantograph carries a pointer which is moved by the operator from point to point along the line of the layout. The cross hairs in the optical center of the microscope which is carried on the short arm of a 50:1 pantograph, is focused on the work and grinding wheel. The intersection of these cross hairs corresponds to the position of the pointer on the 50 times size layout.

The grinding wheel is manually fed to the intersection of the cross hairs after each movement of the pantograph arm and its exact position is observed through the 30 power microscope. Because of the fact that the wheel is always fed up to a predetermined point, accuracy is not affected by wheel wear. An accuracy to within .0005" may be obtained and reasonable care on the part of the operator makes closer limits possible.

WRITE FOR FULL DETAILS

WICKMAN PROFILE GRINDER

THE Wickman CORPORATION
15535 WOODROW WILSON
DETROIT, MICHIGAN

POTOMAC CHAPTER OFFICERS

● While more than 300 frolicked at the Potomac Chapter's Annual Dance in Washington's famous Mayflower Hotel, May 12, officers of the chapter gathered for this photo. *First row, left to right:* E. A. Peterson, Secretary; R. F. Plitt, Treasurer; E. M. Seifert, Chairman; Jay C. Reed, First Vice-Chairman. *Second row:* A. F. Campbell, Reception; R. P. Thayer, Educational; E. R. Redfield, Editorial; D. L. Lattin, Membership; G. M. Gohn, Publicity.

●

(Continued from page 202)

held June 11, at the Hotel Foeste, Sheboygan, Wisconsin, with a technical session on the uses and methods of manufacture of "Ampco Metals".

The session was highlighted by sound color movies presented by Oscar Frohman, Chief Engineer, Ampco Metals, Incorporated, and Ray W. Jecker, Secretary-Treasurer of the concern.

Fort Wayne: Membership Chairman Evans, reporting on the work of his committee, told his listeners at the June 9, meeting, that an application for the Chapter's 100th membership had been received.

Coffee speaker at the meeting was Alex M. Campbell, United States Attorney, who discussed the "Prosecution of the Bund".

"Tool Design and Its Relationship to Hardening Hazards and Tool Life" was the technical subject discussed at a two-hour session by H. J. Stagg, Holcomb Works, Crucible Steel Company.

Hamilton: One hundred and twenty members and guests gathered at the Royal Connaught Hotel, May 14, to hear A. M. Johnson, President, Barnes Drill Company. Subject of Mr. Barnes talk, illustrated with motion pictures, was honing machines and their operation.

A month later, June 12, the chapter held its Field Day at the Dundas Golf and Country Club.

Hartford: At the last meeting of the season, June 7, more than 400 engineers and guests feted the Chapter's Past-Chairman, Ray Morris, President of the Society. Past National President, A. H. d'Arcambal, renowned for his smile, wit and humor, presided at the testimonial at which Mr. Morris was presented a sterling silver water pitcher by Chapter Chairman Carl W. Moeller, in behalf of Mr. Morris' own chapter.

Speaker of the evening was J. Carlton Ward, President, Fairchild Engine and Airplane Corporation. His address was followed by variety entertainment with professional talent.

Kansas City: Meeting at Fred Harvey's, Union Station, June 2, this chapter presented another of the outstanding technical sessions it has developed. Dinner speaker at the meeting was Elon Miller, Supervisor of Works

(Continued on page 206)

No. 34 ABRASIVE SURFACE GRINDER

with the VERTICAL SPINDLE *that works for* VICTORY

On many a production line, the ABRASIVE No. 34 is grinding out small parts that are unusually accurate, smooth and flat. The vertical spindle, and cylinder type wheel, speed output and cut costs in producing such work as small flat dies, washers, punches, spacers, parallels, chasers and raising blocks. Engineered and built to ABRASIVE's high standards, the No. 34 offers many important features including the one-piece bed casting, as originated by this Company.

Ask you nearest dealer for information concerning this and other ABRASIVE Grinders — or write the factory direct.

ABRASIVE MACHINE TOOL CO.
Dealers in Principal Cities
EAST PROVIDENCE · · RHODE ISLAND

After June 1, 1943 our New England and Metropolitan New York representative will be RUDEL MACHINERY CO. with offices in New York City, West Hartford, Conn., and Boston, Mass.

DELIVERY
IMMEDIATE

FEDERAL
Taperlock Plastic
GAGE HANDLES

LIGHT WEIGHT PLASTIC HANDLES give gages more sensitive touch because they are lighter than any metal. They reduce fatigue and insulate gages from bodily heat, safeguarding accuracy.

EASILY MARKED for identification with the same stamps used for marking metal handles.

LOW COST represents a real saving.

IMMEDIATELY AVAILABLE IN 6 STANDARD SIZES and in any quantity.

MADE IN FOUR COLORS, Red, Yellow, Green, Black for quick identification of types or sizes.

IDEAL FOR THE NEW GLASS GAGES. Users and makers find that gages of glass require a lighter than metal handle. This lightness reduces the danger of breakage and also adds to the sensitivity.

FEDERAL TOOL CORPORATION

402 North Leavitt Street — Chicago, Illinois

HYBCO TAP GRINDERS

Lengthen Tap Life — Salvage Broken Taps
Improve — Increase Production

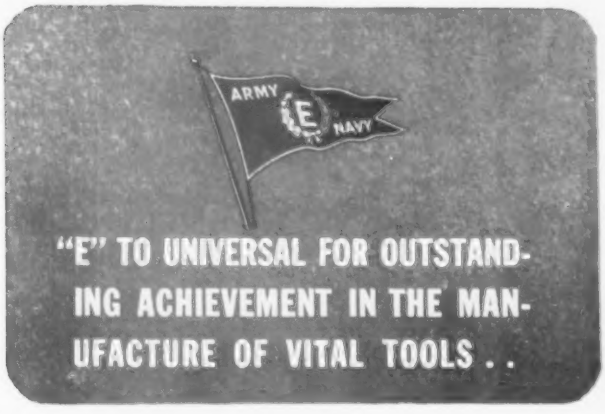
ALL THE VITAL POINTS

SHARPEN TAPS AFTER CENTER IS DESTROYED

Bench, Floor, Floor Exhaust Models. Capacities: Machine Screw to 1½" Hand Taps. Write for Catalogue.

HENRY P. BOGGIS & COMPANY

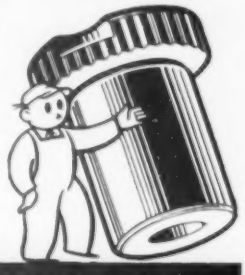
1279 W. Third Street • Cleveland, Ohio



"E" TO UNIVERSAL FOR OUTSTANDING ACHIEVEMENT IN THE MANUFACTURE OF VITAL TOOLS . .

We are proud to announce that we have been awarded the coveted Army-Navy "E" in recognition of the quality and quantity of the Universal precision parts we have been producing for the war effort.

You can improve your jig operations with Universal Drill Bushings. They are straight and round and have superfinished bores for accuracy and long life. Write for complete catalog.



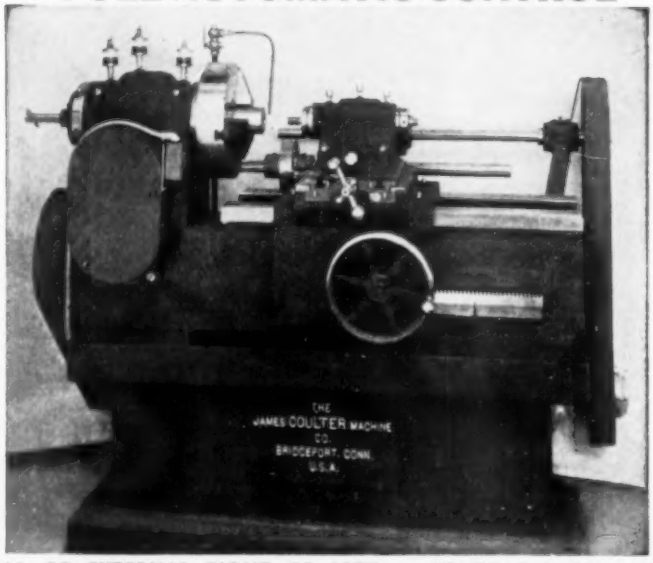
UNIVERSAL ENGINEERING CO.
FRANKENMUTH • MICHIGAN

The
"HOUSE OF PRECISION"
★
Jansson Gage Blocks—a good standard for precision measurement. Used by leading armaments manufacturers. Preferred by experienced inspectors for their extreme accuracy.
★
JANSSON
GAGE COMPANY
DETROIT • MICHIGAN

Write for Literature and Prices
19208 Glendale Ave.

PRECISION THREAD MILLER

FULL AUTOMATIC CONTROL



INTERNAL OR EXTERNAL RIGHT OR LEFT — UP TO 7 INCH DIAMETERS
COMPLETE MOTOR EQUIPMENT — FIXTURE TO SUIT

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U. S. A.

Now... A 500-POUND WELDING POSITIONER BY RANSOME... *Motor or Hand-Operated*

Here's a versatile machine that will help you do better welding faster . . . on a wide variety of work. It's top-quality equipment and ideal for women welders.

- Table top tilts to 135° from horizontal (45° beyond vertical).
- T-slots in table top simplify clamping of work.
- Handles a 500-lb. load with a 6-inch center of gravity and a 6-inch eccentricity.
- Cut gears are used throughout.
- Clutch permits free rotation of table top, by hand.
- Available with elevating base to give 42 inches from floor to table top.
- On motorized machine, Reeves variable-speed drive gives range up to 1 r.p.m. for table rotation. Choice of power or hand-wheel tilting.

Other Ransome Positioners cover a range of types and sizes up to 20 tons. *Write for literature* . . . and for recommendations to meet your particular needs.

Ransome WELDING POSITIONERS

INDUSTRIAL DIVISION • RANSOME MACHINERY COMPANY • DUNELLEN, NEW JERSEY

A. S. T. E. DOING

(Continued from page 206)

Simplification, North American Aircraft, who discussed work simplification as developed by his company. At a technical session which followed, D. V. Stevens, Kearney & Trecker, presented the film "Rotary Head Milling". Later, he showed parts made on the machine in local industries. E. V. Peterson, of North American, led an open discussion on related problems presented by members attending.

Los Angeles: Three hundred members and guests gathered June 12, to hear A. A. Schwartz, Tool Development Engineer, Bell Aircraft Corporation and contributor to the Tool Engineer Magazine, and Adrian Potter, Executive Secretary of the Society. Schwartz was visiting the West Coast for the joint technical session presented by the Society of Mechanical Engineers and the A.S.T.E. The meeting, held at Scully's Restaurant, was attended by San Diego Chapter members.

Montreal: At an Executive Meeting, June 6, Windsor Hotel, officers of the chapter accepted with regrets the resignation of Chairman J. W. Davis. Resigning because of "pressure of work", Davis will be succeeded as Chairman by R. B. Douglas, current Vice-Chairman. A new second officer will be elected.

New Haven: Ray Morris, National President, headlined the chapter's meeting June 3, with a ringing message on contributions to the war effort by Tool Engineers. Technical speaker was John B. Frevsinger, North and Judd Manufacturing Company. His talk, "Gadgeteering by the Tool Engineer" was illustrated by personally conceived devices designed to forward engineering development.

At an executive meeting, five days later, it was revealed that at least 10 new members may be accepted during July. During the summer, Publicity Committeeman Frank Shute will prepare a monthly newsletter which "will call particular attention to key articles . . . in the Tool Engineer as well as other matters of local interest".

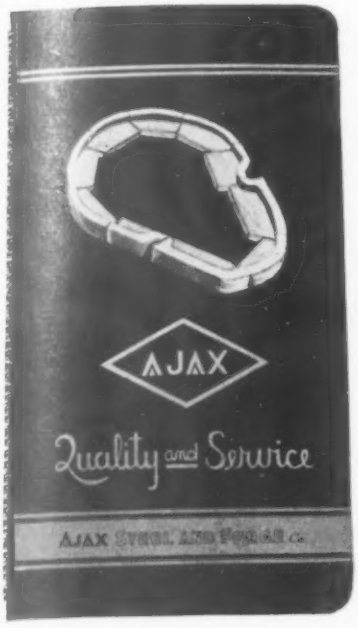
Pittsburgh: Sixty-six Tool Engineers and guests gathered at the Steel Capital's Hotel Henry, June 4, to hear discussions on reclamation and conservation of waste materials and the merits and methods of tool salvage. Speaking on salvage was O. C. Rodgers, War Production Board, Pittsburgh office. The advantages of tool salvage by welding were expounded by Larry Lang and Tom Sutton, National Tool Salvage Company, Detroit. Mr. Lang was author of a feature article on this subject presented in The Tool Engineer Magazine last year.

Seattle: Urging greater exchange of tools and tooling ideas, Ray Morris, National President, addressed 100 members and guests of the chapter May 7. Morris was optimistic about the future of the Society and advised his listeners to consider the potentialities of such new mass-production materials as powdered metals, glass, plastics and plywood.

(Continued on page 208)

Send for Valuable Booklet

Forgings For All Industries
Rough Turned or Finished Complete



Composite Die Sections
Extrusion Tools
Crankshaft Forgings
Gear Forgings
Die Casting Dies

Rings, Discs, Blocks Shafts, Hubs, Bars, and Special Shapes. Tool Steel of all Makes
S.A.E. and N.E. SPECIFICATIONS
Stainless & Copper Forgings
May we Serve You?

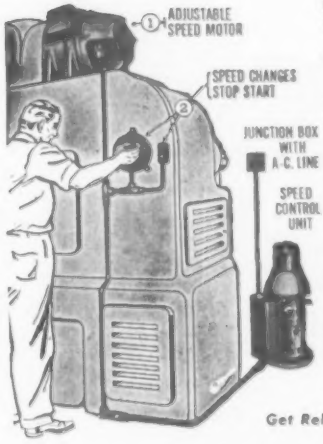
AJAX STEEL & FORGE Co.

205 ADAIR STREET — DETROIT, MICHIGAN

AN All-Electric ADJUSTABLE-SPEED DRIVE

FOR A-C. CIRCUITS
SPEED RANGES UP TO 16 TO 1
SIZES — 1 TO 30 hp.

RELIANCE VS DRIVE



1 DIRECT DRIVE. Lower cost, because fewer parts (no intermediate speed-changing device). Power is closer to where it is needed. Use less space. Streamline your machine design.

2 SPEED CONTROL CONVENIENCE WITHOUT LIMITATIONS. Place speed-changer and start-stop button at any convenient point to which a wire can be run. Control always within easy reach.

3 OPERATES ON A.C. POWER.

4 QUICK STOPPING.

5 SMOOTH, FAST ACCELERATION.

6 REVERSING.

7 SPEED-SETTING.

8 SLOW FOR THREADING and INCHING.

Get Reliance Bulletin 311 for details — and other advantages.

RELIANCE ELECTRIC & ENGINEERING CO.
1088 IVANHOE ROAD • CLEVELAND, OHIO
Sales Offices in Principal Cities

For RUSH War Jobs Order Cullman Sprockets

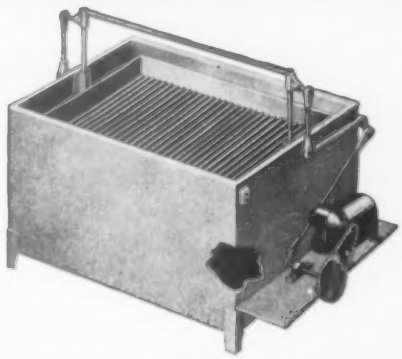
More than 50,000 Cullman Sprockets are available from stock for immediate delivery.

Because of specialized equipment and experience, Cullman Sprockets can be made to your specifications in a relatively short time, and at minimum cost.

Write, telephone, or wire Cullman on any sprocket requirements.

CULLMAN WHEEL COMPANY
1352-R ALTGELD STREET — CHICAGO, ILLINOIS

METAL PARTS CLEANING
Low Cost — Efficient



STURDY-BILT "Simplex"
METAL PARTS CLEANER

A small compact, mechanically simple unit that combines a time proven method with a simplified action. Metal Parts Assemblies, Shells, Cartridges, Castings, Stampings, etc. can be thoroughly cleaned in much less time.

Operator simply loads tray — presses a switch and the "Simplex" does the rest. Can be installed in different departments or in a series for consecutive steps of cleaning, rinsing, coating or treating.

Write for complete information.

STURDY-BILT EQUIPMENT CORP.
DEPT. T7 — WEST ALLIS, WISCONSIN

Also manufacturers of "Sturdy-Bilt" Soaker-Hydro continuous production metal parts cleaners.

★ MARSCHKE ★

Double Adjustment

with a

SINGLE ACTION!

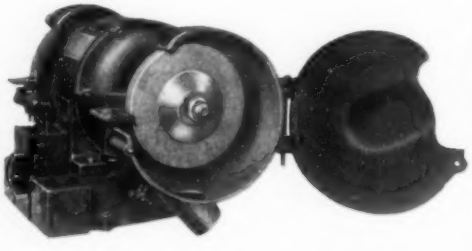
Marschke Pedestal Grinders give you true, smooth spindle rotation (to get most out of high-priced abrasives) PLUS maximum convenience and safety of operation. THIS IS ACCOMPLISHED from the patented Marschke Universal Guard BY A SINGLE ACTION . . . spark shield over wheel opening is brought automatically into proper relation with wheel when work rest is adjusted to follow wheel wear.

★Marschke 2 HP, 12" Pedestal Grinder with Universal Guards. Designed for efficiency, economy and long life.

★ ★ ★

Marschke Grinders have Machine Tool characteristics in contrast with machines commonly described as "Emery Wheel Stands" . . . let the Marschke representative in your area give you details or WRITE DIRECT TO—

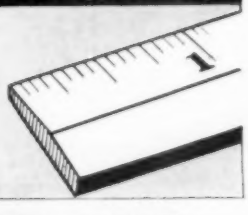
VONNEGUT
MOULDER CORP.
1820 Madison Ave.
Indianapolis, Ind.



Guard hugs wheel closely until wheel is worn to flanges. Note flanged and hinged side cover and exhaust port — features not usually found on this size and price machine.

Imagine dividing an inch into
TWO HUNDRED THOUSANDTHS (0.00002)

That's the ACCURACY, ±
OF A



DUBLIFE

Reversible PLUG GAGE

WITH TWO LIVES

Only experienced gage specialists with finest equipment can insure such precision. To this United ***adds another life to the gage.*** Each end, "Go" and "No Go" reversible. Turn either end when worn and you have a new gage. Plugs locked by bronze split collet in one handle. UPPCO lapped enduring finish. Sizes: .030 to 1".

Send for Catalog showing line with complete Engineering Data

Also other gages of American Gage Design. Write

UNITED PRECISION PRODUCTS CO.
3517 West Belmont Ave. **Chicago, Ill.**

A. S. T. E. DOING

(Continued from page 208)

South Bend: Meeting May 14, for dinner and a technical session, more than 100 members and guests heard Albert G. Mather, President, DoAll Midwest Company, and watched a film on the Continental Process of die making. Later, Mr. Mather showed sample dies and answered questions on the process.

At a board meeting, May 20, arrangements were made for a gala meeting June 19, at the Christiana Club.

St. Louis: Harold Roberts, Deep Freeze Division, Motor Products Company, presented an illustrated lecture on refrigeration in industry before 200 members and guests at the regular monthly meeting, June 3, at the Hotel Melbourne. The chapter will hold its annual stag picnic at Tamme's Grove, Fenton, Missouri, July 19, it was announced.

Toronto: More than 80 Canadian Tool Engineers were introduced to the mysteries of the "Spectrum" May 13, when J. W. Bateman, General Electric Company, Toronto, demonstrated with elaborate electrical apparatus recent developments in the field of light and color.

The extent and utilization of copper in war production was revealed in a sound color movie, "Copper Goes to War," filmed and presented at the meeting by the Anaconda American Brass, New Toronto.

Twin Cities: Seven new members were accepted by the Minneapolis-St. Paul Chapter at the last meeting of the season, held last month in St. Paul. Following a technical color film on die casting, presented by the New Jersey Zinc Sales Company, Twin Cities Member Charles Adams conducted a question and answer session on die casting.

Twin States: Irwin F. Holland, Regional Director, summarized the activities of the national A.S.T.E. organization at a regular dinner meeting, June 19, Springfield, Vermont. A tendency toward furnishing the individual machine operator more complete gaging equipment was revealed at the technical session by J. B. Wilkie, Gage Sales Engineer, Pratt & Whitney Division, Niles-Bement Pond. "Cradle of Victory," a movie produced by Consolidated Aircraft Corporation, was shown.

Washington: L. W. Ballard, Industrial Tool Specialist, General Electric Company, Philadelphia, outlined developments in "Electronic Motor Control" at the monthly meeting of the Potomac Chapter, May 6. Mr. Ballard's description of electronic applications for the machine tool field prompted a long period of discussion. A new film on N. E. Steeks, "How Steel Is Made", was presented by Bethlehem Steel Company. Six days later, in Washington's Mayflower Hotel, the Chapter held it's annual dance.

Industrial applications of bismuth alloys and the uses of Cerromatrix, Cerrobend and Castaloy were described to 75 Tool Engineers meeting June 3, in the nation's capital. The speaker was J. D. Trethaway, Manager of Al-

(Continued on page 210)

In War, as in Peace . . .

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

REPRESENTATIVES AND DISTRIBUTORS

ANSONIA, CONN., Jackson Associates.
BOSTON, MASS., Jackson Associates.
PHILADELPHIA, PA., Castaloy Metal Sales Company.
BROOKLYN, N. Y., Belmont Smelting & Refining Works.
CHICAGO, ILL., Sterling Products Co., Inc.
CLEVELAND, O., Die Supply Co.
DALLAS, TEX., Metal Goods Corporation.
DETROIT, MICH., Castaloy Metal Sales Company.
HOUSTON, TEX., Metal Goods Corporation.
KANSAS CITY, MO., Metal Goods Corporation.
LONDON, ENG., Mining & Chemical Products, Ltd.
LOS ANGELES, CAL., Castaloy Metal Sales Company.
MILWAUKEE, WISC., Harry C. Kettelson, Inc.
MINNEAPOLIS, MINN., Northern Machinery & Supply Co.
MOLINE, ILL., Sterling Products Co., Inc.
MONTREAL, CAN., Dominion Merchants, Ltd.
NEW ORLEANS, LA., Metal Goods Corporation.
ST. LOUIS, MO., Metal Goods Corporation.

CERRO DE PASCO COPPER CORPORATION

40 WALL STREET - - NEW YORK, N. Y.

ARMY E NAVY

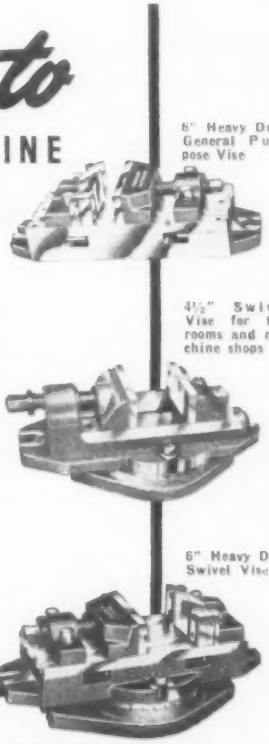
"E" TO UNIVERSAL FOR OUTSTANDING ACHIEVEMENT IN THE MANUFACTURE OF VITAL TOOLS . .

We are proud to announce that we have been awarded the coveted Army-Navy "E" in recognition of the quality and quantity of the Universal precision parts we have been producing for America's war effort.

You can improve your production with Universal Collet Chucks which grip as strong as solid steel in both a radial and axial direction without marring the tool shank. Write for complete Collet Chuck catalog.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH · MICHIGAN

Producto
MODERN MACHINE *Vises*



There are no Vises that compare with PRODUCTO Vises.
These superior and modern Vises are so much better than the conventional design. Bodies fitted with hardened and ground wearing plates — extra large opening between jaws—large screw and nut for movable jaw — make these 4½" and 6" Vises practicably indestructible and useful for very long wear.
We also make Cam Lock Vises in 4", 5" and 7" sizes for production milling and drilling operations. Best vise for this purpose.
Don't bother with old tools — use Modern Machine Vises.
Ask for 8-page circular—
Also manufacturers of Producto Die Sets and Die Makers' Accessories.

PRODUCTO

The
PRODUCTO MACHINE COMPANY

940 HOUSATONIC AVE. BRIDGEPORT, CONN.
3017 MEDBURY, DETROIT, MICH.

EVANS HIGH SPEED STEEL **REAMERS**

LOOK AT THESE FEATURES

- Extension pilots for line-up work.
- Cannot fall in slots or oil grooves.
- 35 to 80 thousandths expansion.
- Left and right spirals.
- Full bearing surface.
- Perfect alignment.
- Chrome-like finish.
- Will not chatter.
- No honing.

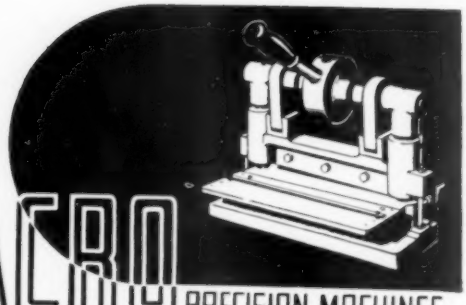
VICTORY

A PROVEN PRODUCT

WRITE FOR CIRCULAR

EVANS REAMER AND MACHINE CO.
Successors to EVANS FLEXIBLE REAMER CORPORATION
4539 Ravenswood Ave. Chicago, Ill.

SOLVE YOUR
"SHORT RUN"
DIE PROBLEMS
with DI-ACRO PRECISION MACHINES
(DIE-ACK-ROW)



SEND FOR CATALOG
"Metal Duplicating without Dies"
It's an eye-opener on what you can do without dies, shows typical parts, and gives sizes and capacities of all models of Di-Acro Shears, Brakes, Benders.

"Extra Special Rush! Speed it up! When can you deliver?" Maybe you don't have to wait — Wait — WAIT — for dies! Try "DIELESS DUPLICATING" with Di-Acro Shears, Brakes, Benders. These are *precision* machines — all duplicated work is accurate to .001". You'll get a new slant on "short-run" production problems from the great variety of parts which can be produced by Di-Acro Machines. Thousands of them are in use saving Man Hours and Critical Materials.

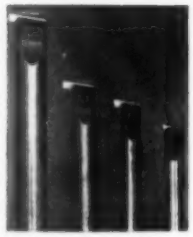
BENDERS
Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity — Bender No. 1 — 1/4" round cold rolled steel bar. Bender No. 2 — 1/2" cold rolled steel bar.

BRAKES
Di-Acro Brake forms non-stock angles, channels or "Vees". Right or left hand operation. Folding width — Brake No. 1 — 6". Brake No. 2 — 12". Brake No. 3 — 18".

SHEARS
(Illustrated)
Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. Shearing width — Shear No. 1 — 6". Shear No. 2 — 9". Shear No. 3 — 12".

O'NEIL-IRWIN DI-ACRO PRECISION MACHINES MFG. CO.
307 8th Avenue So., Minneapolis 15, Minn.

EVEREDE



BORING BARS
The ONLY Boring Bars with The Economical Triangular Bit
Made of finest nickel steel, heat treated, uses a H.S. Steel or solid Tungsten bit. Bit cuts ahead of the bar and allows boring of a hole right up to the shoulder. Designed for rigidity and adaptability to all uses. Bars for lathe boring range from 7/32" to 3½". From 7/32" to ¾" with precision ground shanks for jig boring.

EVEREDE
BORING BAR HOLDER
Adjustable to fit various size lathes
Send for Catalog

WILLIS STUTSON ASSOCIATES
184 N. WACKER DRIVE, CHICAGO, ILL.

NEW MEAD "AIR-CLAMP"

For Greater Drill-Press Output

Whenever a drill comes down, something must hold the work. Wherever a drilling-jig is required *Air-Clamp* will simplify it. Wherever *speed* is desired, *Air-Clamp* will produce it. *Air-Clamp* holds with relentless pressure; is undisturbed by size variations (such as in castings), it scoffs at vibration (how many drills have been broken due to faulty hold downs?), chatter, snagging. *Air-Clamp* holds work of any size or shape in any position, at any angle. It can pay for itself on a single fixture; it can save its cost on a few days' drill-press output. Reduces operator-fatigue. Saves hours and dollars in drafting room, jig department, tool room and production line. *Air-Clamp* fits only drill-press having a cylindrical column. Special fixtures for Tee-slotted tables, light milling work, etc. Hand and/or foot control. Shipped on approval to responsible concerns.

Foot Air Control READY!
For air-operated devices. Frees hands; speeds work.

MEAD SPECIALTIES COMPANY
15 S. Market St., Dept. 73-TE Chicago, U. S. A.

(Continued from page 208)

loy Sales, Cerro de Pasco Copper Corporation. A General Electric color film, "Railroading", completed the final program of the Spring session.

Worcester: With 104 at dinner and 20 more for the meeting, the chapter held its last meeting of the season, June 1. Highlight of the meeting was a talk by J. A. Rinek, Flight Test Engineer, Pratt & Whitney Aircraft. Guests included members of the Foremans' Club, Heald Machine Company and the Worcester Taper Pin Company. THE END

INDUSTRIAL NEWS DIGEST

(Concluded from page 128)

Hudson: Production of aluminum pistons and parts for Wright cyclone airplane engines has reached a new high under an expansion program in this company's Detroit plants.

Output of these aircraft parts, finished to millionths of an inch, is running approximately two and one-half times the originally contemplated maximum and will continue to expand monthly, Hudson engineers tell us. Conversion of a portion of the concern's facilities to the manufacture of radial engine parts was a "natural" for this pioneer motor car builder. The Hudson eight-cylinder passenger car engine, rated at 128-horsepower, used aluminum pistons.

It is significant that some 30 per cent of the workers on this machining job are women. It is estimated that at the peak the percentage of women workers on this job may mount to as high as 70 per cent. A large portion of these feminine workers are graduates of Hudson training schools.

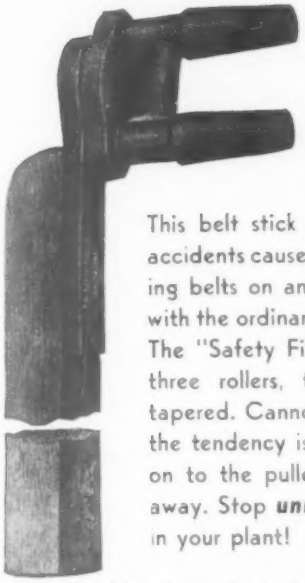
The piston surface is finished to an accuracy of ten millionths of an inch or less, buffed to a mirror finish and inspected at every step for dimensions or imperfections. The accuracy required is indicated by the fact that despite the removal, during machining of the piston, of half the weight of the original rough forging, the finished product may only vary from a specified weight by not more than four hundredths of a pound.

* *

Light Metals: Though its end-products are less dramatic than those of other motor manufacturers, G M's Chevrolet Motor Division is engaged in important and large-scale operations. Latest news from this organization is the conversion of a division of its Grey Iron Foundry in Michigan to the production of magnesium castings. The rapidly increasing output of this product is being used by the concern in its aircraft engine program (See The Tool Engineer, May 1943).

In the field of light metals, Chevrolet also is producing aluminum forgings in volume. Three forge plants are turning out propeller blades, bomber parts, aircraft engine parts, pistons and a variety of other items for the division's own use as well as for other war contractors. A fourth plant, recently acquired, is now being equipped to produce additional aluminum forgings. THE END

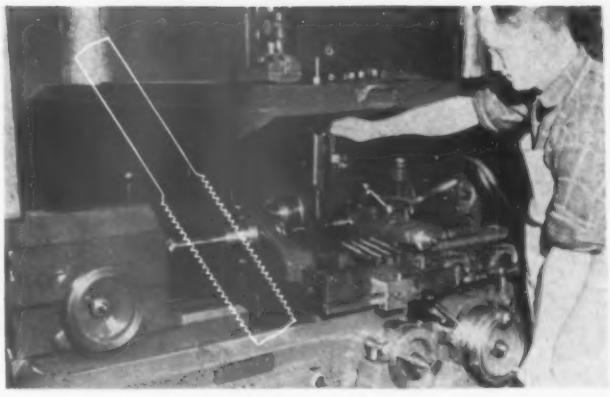
Our Safety First Belt Stick
Makes Accidents Impossible!



This belt stick attachment prevents accidents caused by operators throwing belts on and off moving pulleys with the ordinary single pin belt stick. The "Safety First" is provided with three rollers, two of them being tapered. Cannot catch. At all times the tendency is for the belt to slide on to the pulley as the stick slides away. Stop ***unnecessary*** accidents in your plant!

Style S1 for belts 1" to 3" Style S2 for belts 3" to 4"
$2.00 each, $20.00 dozen

THE READY TOOL COMPANY
585 IRANISTAN AVE.
BRIDGEPORT CONN.



A COMBINATION HARD TO BEAT!

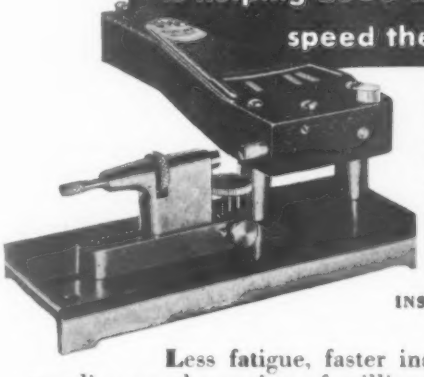
The right steel — the most modern machines — and skilled craftsmen — those are the ingredients of superlative tap-making. At Threadwell, the steel is metallurgically correct. The machines are the most modern that money can buy. (The Ex-Cello thread grinder in the photo is a good example.) And at Threadwell the men have tap-making skill that is a heritage of generations of threading tool craftsmen. Your "Threadwell" distributor will give personal attention to your tap needs.

THREADWELL TAP AND DIE CO., Greenfield, Mass., U.S.A.

Export Stocking Distributors
CANADA: BRIDGE MACHINERY CO., MONTREAL
ENGLAND: SKYLUX LTD., LONDON

Threadwell
"TAPS OF DISTINCTION"

This New War PRODUCTION GAGE
is helping 2500 war plants speed their output



MICRO-CHEK with base plate only **$9.75**
Adjustable Anvil $3.00
Other type Anvils available.

INSTRUMENT SIZE 6" x 2¼"

Less fatigue, faster inspections, are speeding up the gaging of millions of precision parts in more than 2500 war plants now using the TRICO MICRO-CHEK. Its advantages:

1. Greater speed with no sacrifice of accuracy; 2. Faster reading, less eyestrain and fatigue on operators; 3. Original accuracy continuously retained by resetting with original master parts; 4. Inexperienced workers quickly become accurate inspectors.

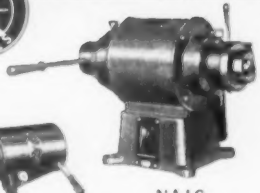
Write for illustrated booklet showing many applications of Micro-Cheks.

TRICO
TRICO PRODUCTS CORP.
Room 95 Trico Building, Buffalo, N. Y.

SCHAUER ELECTRICAL TOOLS

. . . are ***better tools*** as a result of **36 years** of progressive manufacturing. Use these IDEAL Tools in your shop.

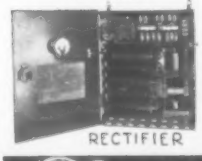
SPEED LATHES
For finishing, lapping and burring operations on small parts. Many ***standard*** models:—hand or foot operated . . completely automatic . . air operated . . infinitely variable speeds. Motors from ⅛ HP to 5 HP.


NAIC

GIUX

GA1F

G2F


RECTIFIER

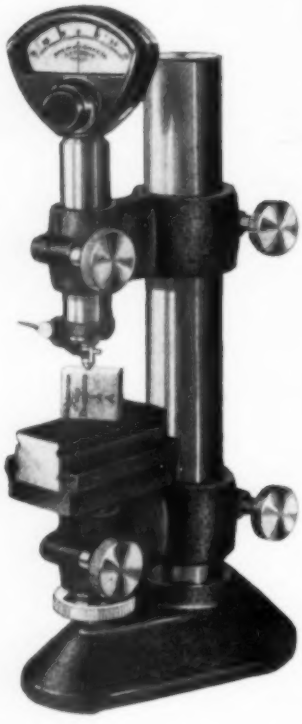
TOOL POST GRINDERS
For external and internal grinding: — on cutters, bits, spindles and similar work.

UTILITY GRINDERS
Bench or Floor Type AC or DC—1 HP, 1750 RPM ballbearing, totally enclosed motor.

ELECTROX RECTIFIERS
For converting AC to DC for all commercial purposes . . . copper oxide, selinium or bulb types.

DA3F

"the originators of today's Speed Lathes"
SCHAUER MACHINE CO.
2066 READING ROAD CINCINNATI, OHIO.



MIKROKATOR

"Mikro" (Minute)

Frictionless Amplification

Complete elimination of friction, lag, and backlash insures positive, dependable repeat readings. Pointer responds instantly to the slightest movement of measuring tip without swinging past the true reading. No waiting for pointer to come to rest.

No lights or electro magnets are used, as the amplification is 100% mechanical, thus eliminating a warming up period to permit the temperature of the instrument to become stabilized.

There are no electrical connections thereby enabling the instrument and stand to be readily moved about in the shop, for use in different locations.

Graduated—
.0001" to .00001"
Graduated—
.001 mm to .0002 mm

SWEDISH GAGE CO. of AMERICA

8900 ALPINE AVE. **DETROIT, MICH.**

ARMSTRONG

TOOL HOLDERS and TOOLS

ARMSTRONG TOOL HOLDERS are the standard on lathes, planers, slotters and shapers. The same extra strength, superior design, balance and fine tool quality that has put ARMSTRONG TOOL HOLDERS in over 96% of the Machine Shops and Tool Rooms is found in ARMSTRONG WRENCHES, ARMSTRONG "C" CLAMPS — in all ARMSTRONG TOOLS. Each ARMSTRONG LINE is complete in sizes and types with every tool the finest of its type.

Write for Catalog C-39
250 pages of fine tools

ARMSTRONG BROS. TOOL COMPANY
"The Tool Holder People"
360 N. Francisco Avenue, Chicago, U. S. A.
Eastern Sales Office: 199 Lafayette St., New York

Amazing S-22 Synthetic
ETCHING STAMPS

Thousands of our new "S-22" Synthetic stamps now in service have proved that this new material outlasts rubber or other synthetics by from 3 to 4 times, when used with acid etching inks. Order "S-22" next time you need inspection stamps.

INSPECTOR'S KIT

Made of acid proof, non-critical material, this new Kit holds stamps, etching ink, ink pad and neutralizer. Inexpensive, compact and convenient. Write for quotation.

Write for Bulletin S--Catalog 146

This valuable bulletin illustrates the various styles of stamps available. Write for your copy today.

JAS. H. MATTHEWS & CO.

3945 Forbes Street Pittsburgh, Pa.
Branch Plants
New York, Boston, Chicago, Philadelphia, Newark, Syracuse
District Sales Offices
Cleveland Detroit Hartford Birmingham

War-Learned Proficiency Ready for Post War Production

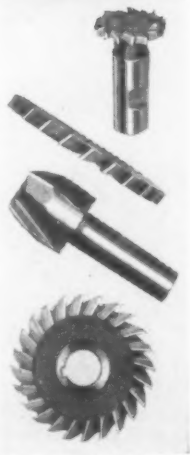
A.C.E. SPECIAL CUTTING TOOLS

We are busy—very busy turning out special cutting tools of many types and sizes for a host of defense plants.

But when peace comes you will find us just as ready to tackle your post war tooling problems with new methods we have learned for better, faster work.

Send us your immediate needs for prompt estimates.

Certain attractive territories open for active agents.



AMERICAN CUTTER & ENGINEERING CORP.
31751 Mound Road
Warren, Michigan

AMERICAN CUTTER

AND ENGINEERING CORP., WARREN, MICH.

SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PRINTS

TUTHILL'S V-BELT DRIVE FOR VICTORY

LONG LIFE — NEGLIGIBLE MAINTENANCE IN HANDLING HEAVY LIQUIDS

From one end to the other, this compact V-belt driven viscous liquid Tuthill pumping unit is engineered for long, dependable and economical service in war-time as in peace. Quiet in operation, simple in construction, it is of the positive-displacement, internal-gear rotary type that has made Tuthill Pumps synonymous with dependability in industry. Features include outboard ball-bearing shaft support, belt tension adjustment by one set-screw, wide range of speeds, capacities and pressures, inexpensive replacements, negligible maintenance.

TUTHILL PUMPS ARE SERVING ARMY NAVY • AIR FORCE MERCHANT MARINE

Write for Viscous Liquid Pump bulletin

TUTHILL PUMP COMPANY

939 EAST 95TH STREET • CHICAGO, ILLINOIS

PALMGREN ANGLE VISES

DRILLING
MILLING
GRINDING
FILING
FITTING
MARKING

Solve Difficult Angle Jobs

- ★ For Tool Room — Production Line — Bench.
- ★ Speed up work — End Makeshift Methods.
- ★ Quick Accurate Setups at any angle.
- ★ Sturdy Longlife Construction.
- ★ All Parts Accurately Machined.
- ★ Jaws Hardened Steel — Plain or Grooved.
- ★ Made in Sizes from 1½" to 8" Jaws.

MILLING

GRINDING

DRILLING

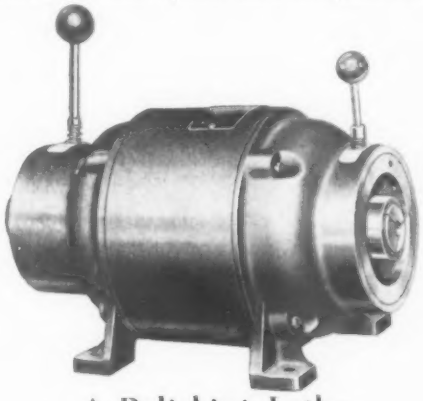
Write for circular P-7 "101 Angle Operations" and complete line of PALMGREN Vises.

CHICAGO TOOL & ENGINEERING COMPANY
Mfrs. of PALMGREN PRODUCTS for over 25 years
8391 South Chicago Avenue, Chicago, Ill.

PRECISION WORK AT ANY ANGLE

Here Is Another Unsurpassed Machine Tool from Crozier Craftsmen

Crozier, the first manufacturer of turret tool posts for bench lathes, has always expanded its line with foresight. Industry's needs are thoroughly analyzed before Crozier-craftsmen build a tool to fill them—then they construct a product that is unsurpassed in its field.



A Polishing Lathe

A hollow spindle adapts this lathe to high volume production for either long or short pieces. All tool marks are removed and a beautiful finish results. Full ball bearing and available in 14 models for collets or chucks.

Bed Turrets • Collets • Collet Attachments
Surface Plates • Polishing Lathes • Turret Tool Posts

Send for Bulletin

Crozier

Crozier Machine Tool Company • Hawthorne, California
Successors to C-B-C Corporation

Rawhide HAMMERS MALLETS

Carefully made, accurately balanced, with weighted heads where extra striking power is needed. Strike forceful blows without marring or battering, without recoil or bounce. Never split, chip, "smear" or crack, retain this true striking face so every blow goes right to the target . . . gets work done. Long wearing, mechanically cured, coiled Rawhide faces far outlast soft metals, plastics, wood or rubber.

Replaceable Heads

Replaceable Insert Faces are available for C.R. Hammers . . . make each a "lifetime" tool.

CHICAGO Rawhide MFG. CO.
1393 ELSTON AVE. ★ CHICAGO, ILLINOIS.

THE PASSING PARADE

T. M. REG. U. S. PAT. OFF.

THE EVER-CHANGING SCENE IN MASS MANUFACTURING

Millard Romaine has returned to the Cincinnati Milling Machine Company, as assistant to the president, after two years' service with the War Production Board at Washington, D. C., and Wright Field, Dayton, Ohio. Other changes at the company include appointment of **Lester F. Nenninger**, engineering department head, as works manager to succeed W. Peaslee, recently retired, and promotion of **Swan E. Bergstrom** from assistant sales manager to sales manager.

R. H. Chadwick, assistant to the manager in charge of engineering at the Fort Wayne works of the General Electric Company, died May 29 at the age of 51. He had been ill several weeks. Following his graduation from Brown University in 1912, he started to work for General Electric in the transformer engineering department and was appointed engineer of that department in 1926. He was named assistant to the manager in 1941. Mr. Chadwick was a member of the A. I. E. E. and served as president of the Fort Wayne Engineers Club.

Carl H. Vaupel has been named assistant general manager of the Cooper-Bessemer Corporation's two plants at Mount Vernon, Ohio, and Grove City, Pa. He has been with the company since January of 1941. Prior to that time he was connected with Fairbanks Morse & Company and the Northern Pump Company. Mr. Vaupel was graduated from the University of Illinois in 1924.

Carl H. Vaupel
Promoted by Cooper-Bessemer

Alfred C. Ryan, with the War Production Board in Washington since last November, has returned to Detroit as assistant deputy regional director in the WPB office.

Judson C. Travis, formerly assistant to the president of Handy & Harman and recently elected to the board of directors to replace Mr. H. H. DeLoss, and was elected vice-president in charge of sales at the organization meeting of the directors on April 29.

Fred O. Burkholder was recently elected president of Ahlberg Bearing Company to succeed the late C. J. Bender. **C. W. Pearsall**, general sales manager of the company, was elected vice-president.

W. O. Lippman was recently appointed manager of the Westinghouse Electric and Manufacturing Company's Canton Ordnance Division. With Westinghouse since 1918, Mr. Lippman for the past four years has been works manager of the Appliance Division plant in East Springfield, Massachusetts.

Edward F. Galvin, formerly sales and service representative of the Greenfield

(Continued on page 216)

Here's how
SKILSAW TOOLS
BOOST PRODUCTION at
LINDBERG ENGINEERING CO.
EVERY MAN
COUNTS FOR MORE
USING SKILSAW TOOLS!
SKILSAW PORTABLE GRINDERS—Speed up all grinding, wire brushing, buffing and polishing on metal surfaces remove rust, scale, paint, etc.
SKILSAW DISC SANDERS—For faster sanding on flat or curved surfaces of wood, metals, compositions. For grinding down raised welds, surfacing, preparing for finishes, buffing and polishing.
Ask over at Lindberg Engineering Company . . . and you'll hear plenty about the speed of SKILSAW TOOLS in turning out essential heat-treating equipment. Look around the Lindberg plants that fly the Army-Navy "E" . . . and you'll see plenty of SKILSAW TOOLS in action . . . speeding up countless drilling, sawing and surfacing operations!
Here's the reason! SKILSAW TOOLS are lighter, more compact, more powerful. They're *preferred* by workers and management alike because they *handle easier* . . . do more jobs *better* . . . and stand up *longer* under today's toughest conditions. Ask your distributor to prove it with a demonstration of SKILSAW TOOLS on your work *today!*
SKILSAW, INC., 5051 Elston Ave., Chicago
New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit
Indianapolis • St. Louis • Kansas City • Atlanta • New Orleans
Dallas • Los Angeles • Oakland • Portland • Seattle • Toronto, Canada
1. With a special rig devised by Lindberg engineers, SKILSAW Model 123 DRILL hones the interior of this air-tight steel cylinder; replaces complicated hard-to-get machinery.
2. Honing rig on long shaft (smoothly driven by SKILSAW DRILL) is moved forward and back by operator, to produce the polished high precision surface necessary.
SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

REID Automatic Feed Surface Grinder No. 2A

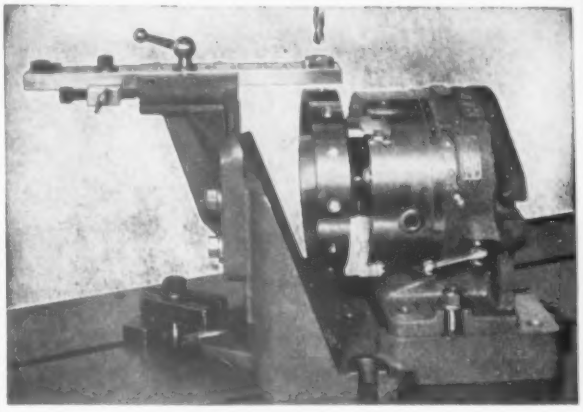
PRICE
$790.00
F.O.B. Less Motor

A Proven Product for Over a Quarter Century with Thousands in Use Daily

Send for Descriptive Literature
EXCELLENT DELIVERIES

Exclusive Selling Agents
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE, R. I.
Agents in all Principal Cities Throughout the World

AN IDEAL INDEXING FIXTURE



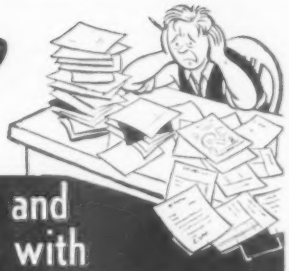
Above: "SUPER-SPACER" applied to a drilling operation. Here a supplemental base is used.

HARTFORD "SUPER-SPACER"

Applicable to DRILLING, MILLING, GRINDING, PLANING, JIG BORING, and SLOTTING. Write today for complete information concerning this unusual indexing fixture.

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

Swamped with Work?



Save Man-Power and Speed Production with APECO PHOTOCOPY MACHINE

Is your production being held up, slowed down or pushed aside waiting for COPIES of letters, blueprints, specifications, records, contracts and other papers? Here is a machine that multiplies Man-Power — releasing men, women *and* their equipment for other work.

Saves Time In Copying
Letters
Blueprints
Drawings
Work Orders
Specifications
Records
and other papers

Save Man-Hours—Use Fewer Employees

Speed up your production — Save valuable hours now spent on copying and tracing by making PHOTO-EXACT copies of *any* form at small expense. Get copies right in your own place of business, without delays. APECO makes copies up to 18x22" — 1 to 100 copies or more. No chance for error! Legally acceptable.

FOOLPROOF OPERATION!

With our simple instructions, any office boy or girl can produce perfect, photo-exact copies of anything written, printed, drawn or photographed. No special skill or dark room is needed.

PROMPT DELIVERY

On machines and supplies. Write for FREE folder *now!* Representatives in all principal cities and Canada.

$55 F.O.B. CHICAGO

AMERICAN PHOTOCOPY EQUIPMENT CO.
2849 N. Clark Street Dept. K-4 Chicago III

Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . .
that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and removes a specialist's experience . . . standard shanks with Morse taper carried in stock.

We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities

STURDIMATIC TOOL COMPANY
5218 THIRD AVE. DETROIT, MICH.

Tap & Die Corporation in the Detroit area, has resigned and taken a position with the U. S. Broach Co. of Detroit. Mr. Galvin is a member of the American Society of Tool Engineers.

Frank E. McGary has been appointed manager of the Murray Corporation Scranton, Pennsylvania plant now under construction. McGary was associated with the Budd Manufacturing Company of Philadelphia before joining the Murray Corporation in 1940.

O. F. Graebner, chief engineer, has been promoted to fill the position formerly occupied by McGary at the Murray main division.

Everett Chapman has recently resigned as president of Lukenweld, Inc. Mr. Chapman has given up his position in order to establish his own consulting engineering business.

George C. Heikes has resigned as director of the zinc division WPB. Mr. Heikes is leaving the War Production Board to become affiliated with the Olin Corporation of East Alton, Illinois.

W. B. Muse has been appointed sales manager of Industrial Abrasives, Inc., Chicago. He was for several years sales manager of the Sterling Tool Products Company of Chicago.

E. W. Trecker has been elected vice-president in charge of manufacturing by stockholders of the Kearney & Trecker Corporation, Milwaukee. He

E. W. Trecker
New Kearney & Trecker v. p.

has had several years' experience in all of the company's departments and has been works manager since 1940.

Hiram ("Hi") Ash is the new president of the National Tool Salvage Company of Detroit. As one of the founders of the company, Mr. Ash was its vice-president for several years. He is a member of Detroit Chapter No. 1, A. S. T. E.

Earl S. Patch has been appointed sales manager of Henry L. Crowley & Company. Formerly an executive of the Morain Products Division of General Motors in Dayton, Patch is said to be an authority in the field of powder metallurgy. **L. A. Shea** was also recently appointed as district manager in the company's Chicago territory. Mr. Shea had previously been with the Burgess-Norton Co. and the Morain Products Division of General Motors.

The O. K. Tool Company, Shelton, Conn., announces that **Ernest Reaney** has been elected vice-president in charge of sales and engineering. Mr.

Earnest Reaney
Advanced by O.K. Tool Company

Reaney, who has been connected with the company for 15 years, assumed his new duties June 1.

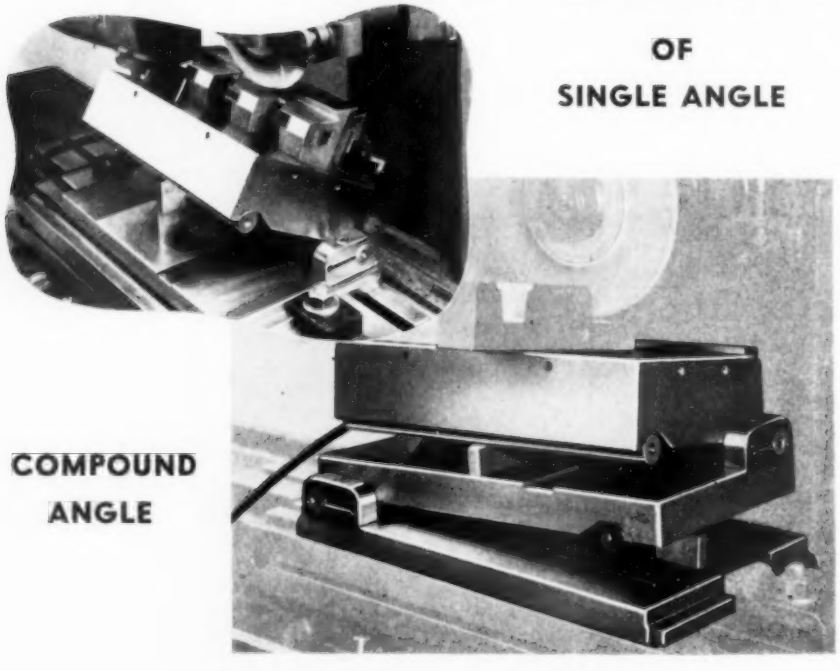
Robert S. Moore has recently joined the research staff of the Quaker Chemical Products Corporation of Conshohocken, Pennsylvania. Mr. Moore is a graduate of the California Institute

(Continued on page 218)

NOW PROMPT DELIVERY

OF

SINGLE ANGLE



COMPOUND

ANGLE

MAGNA-SINES

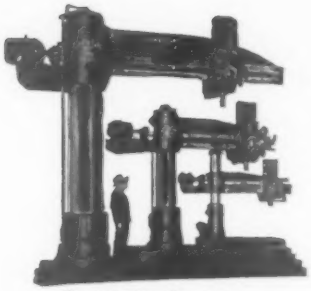
No longer is it necessary for you to wait months to secure the added efficiency in grinding made possible by the Magna-Sine. The great demand for Magna-Sines in the past year brought about many production changes in the Robbins plant. These have resulted in greatly increased volume which assures much faster deliveries.

With Magna-Sines in use for your angular grinding operations, hours of set-up time can be saved and work is completed to the closest possible accuracy. There are no screws or nuts to tighten or loosen . . . no clamps are required . . . magnetic efficiency is guaranteed.

Two sizes are supplied in both compound and single angle models. Non-magnetic models are also available for inspection purposes. Write for full information.

ROBBINS ENGINEERING COMPANY

318 MIDLAND AVENUE • DETROIT, MICHIGAN



"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL FEATURES—

1—LOW HUNG DRIVE TO THE SPINDLE
2—ALL POWER DRIVEN PARTS RUNNING IN OIL
3—QUIET RUNNING AT ALL SPEEDS
4—CONCENTRATED AND CONVENIENT CONTROLS
5—CONSTRUCTED ON UNIT PRINCIPLE

THE

CARLTON

MACHINE TOOL COMPANY

CINCINNATI, OHIO, U.S.A.

Avoid SPOILAGE of Parts!

HERE'S HOW!

Reduce Production Costs!

Faulty tapping and reaming, resulting in oversize or bell-mouthed holes, can often be corrected by merely changing to a type of tool holder that automatically compensates for spindle misalignment.

This is where the Ziegler Floating Tool Holder comes in. It always floats freely, without friction or cramping, taking any and all end-thrusts.

Try it! By eliminating scrapped parts, it pays for itself in a remarkably short time.

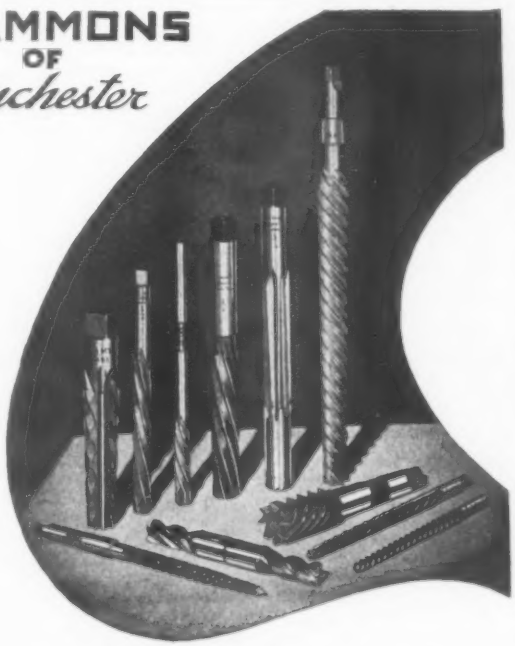
W. M. ZIEGLER TOOL CO.

1920 Twelfth St. Detroit, Mich.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

GAMMONS OF *Manchester*



PRODUCTION TOOLS

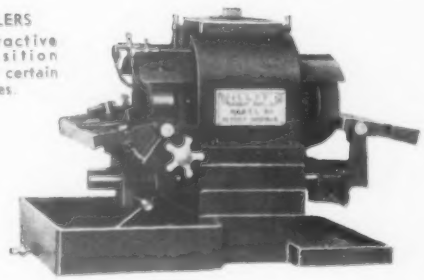
ORIGINATORS AND MANUFACTURERS OF HELICAL FLUTED TAPER PIN REAMERS

THE GAMMONS-HOAGLUND CO., MANCHESTER, CONN.

WILLEY'S NEW

BENCH TYPE GRINDER

DEALERS
An attractive proposition open in certain territories.



The new Model 50 is compact, designed for rapid, economical wet or dry grinding of tungsten carbide tipped tools as well as other types of tool bits ranging up to a maximum of 1¼" square or equal cross sectional area.

A precision grinder built for accurate work, capable of real production. Available with pedestal base if desired.

WRITE FOR FOLDER

Contains complete specifications of Model 50 and other models.

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway. Detroit, Michigan

of Technology and has been employed by the oil industry on the West Coast until coming with Quaker.

W. L. Davis, a former vice-president and general manager of the Romec Pump Company of Elyria, Ohio, is president of the newly formed Precision Products Corporation, Cleveland. Other officers of the new company include **W. A. Gerber,** treasurer, and **E. D. McCurdy,** secretary.

Lorin W. Grubbs, abrasive engineer for Norton Company in Virginia, North Carolina, South Carolina and part of West Virginia and Tennessee has been commissioned a lieutenant (j. g.) in the United States Navy. **Charles A. Babbitt** will take over Mr. Grubbs territory.

Ralph Hulton has been appointed field engineer in the Ohio and Michigan territory for Henry L. Crowley & Company, Inc.

L. W. Long has been appointed sales engineer in charge of mixed apparatus sales for the Allis-Chalmers Manufacturing Company.

J. Charles Galbreath has been elected vice-president of the Plomb Tool Company. Many years with Plomb, Mr. Galbreath has been active in both the sales and the manufacturing phases of the business.

Jack Zimmer, for several years chief engineer at the Edward Katzinger Company Chicago plant, has been ap-

Jack Zimmer
Katzinger's new vice-president

pointed vice-president, according to a company announcement. Mr. Zimmer, who started with Katzinger in 1932 as tool room foreman, has many inventions to his credit.

William (Bill) Woodside has resigned as vice-president in charge of research at the Climax Molybdenum Company after half a century of service to the steel industry. He plans to retire to his Oakland County, Michigan, farm, although he still will retain his position as chairman of the board of both the Park Chemical Company and the American Twist Drill Company. **Alvin J. Herzig,** present chief metallurgist at the company, will take over Mr. Woodside's duties.

Stokerunit Corporation announces that its new Eastern sales manager is **Ronald S. Walker,** who for many years was sales manager for the Barnes Drill Company of Rockford, Ill. His headquarters will be at Bloomfield, N. J.

C. K. Swafford, works manager of the Gisholt Machine Company, has been elected a vice-president of the company. He will continue his duties as works manager which he took over in 1930.

James L. Lefler now is tool superintendent for Bendix Aviation, Inc., North Hollywood, Cal., following his promotion from chief tool designer. He formerly was connected with the Caterpillar Tractor Company at Peoria, Ill.

Lee Diamond, formerly with the Bromley Engineering Company, has opened his own consulting service under the name of Diamond Engineering Company with offices at 3456 Trumbull, Detroit. The concern will utilize a small, highly-trained staff, specializing in tool design and special purpose equipment.

Robert A. Boyer, research chief for the Ford Motor Company, has resigned, effective July 1st. He designed and built the first all-plastic car body for the Ford Company. Before making any definite plans for the future, Mr. Boyer will take a vacation.

THE END.

And Now!

A COOLANT PUMP FOR SMALL MACHINES

A mounting bracket type pump that offers a choice of three outlets from which piping can be arranged to left, right, or back through the coolant sump. Mounted integral with heavy duty, long hour, totally enclosed ball-bearing motors, fully guaranteed by reputable motor manufacturers. Despite its diminutive size, it performs with the same high efficiency as its larger counterparts. Seal-less type pump, operating with no metal-to-metal contact of moving parts. Designed especially for service on small machines such as grinders, drills, tapping machines, etc.

MODEL MVBD

BUY WAR BONDS

PIONEER PUMP & MFG. CO.
19645 JOHN R STREET
DETROIT 3 • MICHIGAN

Boyar-Schultz PROFILE GRINDER No. 2

Designed for intricate contour and profile grinding in tool and die work, Boyar-Schultz Profile Grinder No. 2 is making a real contribution to the war effort in the production of aircraft, guns, tanks, locomotives and other heavy munitions.

The model shown here is truly a versatile machine tool with two grinding spindles, each operating at the high speed of 10,000 R.P.M. This speed assures highly satisfactory work on any contour grinding likely to be encountered in both tool and die work and in production.

Available in both Single Spindle and Dual Spindle as shown.

Let Us Send you Descriptive Literature

BOYAR-SCHULTZ CORPORATION
2116-H WALNUT ST. CHICAGO, ILL.

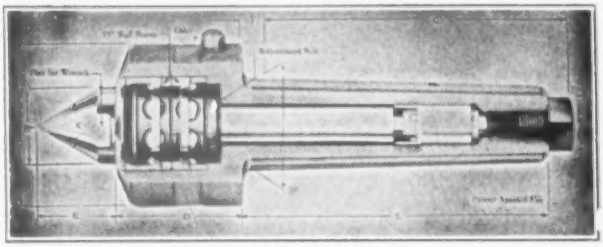
The Improved Nielsen Live Centers

LOAD CAPACITY—200 TO 40,000 LBS. AT 100 RPM.

HAVE ADJUSTMENT TO TAKE UP WEAR AND PRELOAD BEARINGS

STANDARD MORSE TAPER No. 2 TO 6 IN STOCK

Write For Catalogue



NIELSEN, INCORPORATED

LAWTON, MICHIGAN

"SUPER-KOOL" "81X"

Thred Kut "99"

Stuart Grinding Oils

"Excelene"

. . . for Top Efficiency in Thread Grinding

STUART Thread Grinding Oils are in wide use, giving unequalled efficiency at nominal cost. Developed in co-operation with leading manufacturers of thread grinding machines and wheels, they have been proved in many of the largest and most modern metal working plants . . . A Stuart Oil Engineer will gladly help you achieve top efficiency in thread grinding. Ask him to come in.

For All Cutting Fluid Problems

D. A. STUART OIL CO.

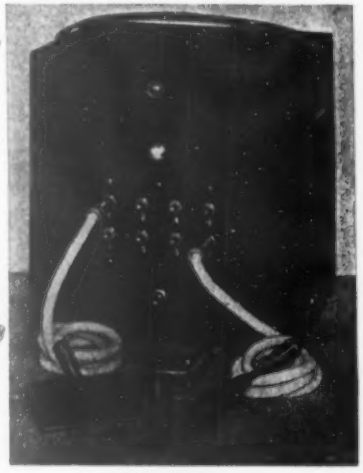
Chicago, U.S.A. • LIMITED • Est. 1865

Warehouses in All Principal Metal Working Centers

Mark Iron, Steel and Carbides the Etchgraph *Way*

•

THOUSANDS IN USE



NEW MODEL

Buy the Original Electric Etcher

Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

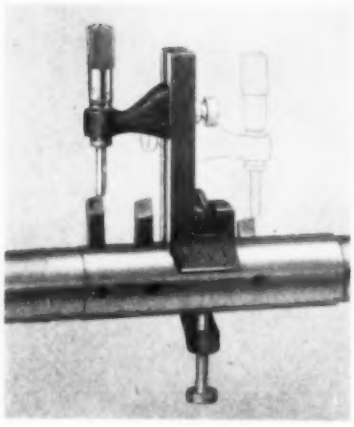
WITH NEW ELKONITE TIP PENCIL

Mark *hardened parts*, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly.

Write for circulars and prices.

BREWSTER-SQUIRES COMPANY
54 Church Street
NEW YORK, N. Y. U. S. A.

BARTELT
Model "B"
PEDESTAL
Micrometer



Formerly called
Bartelt
Tool Setting Gage

★ FOR FAST, ACCURATE SETTING OF CLOSE-SPACED BORING TOOLS

By reducing the length of the base and by providing slides on both sides of the pedestal, the usefulness of the Bartelt Pedestal Micrometer has been greatly increased with this brand new Model "B". As the illustration shows, tools placed 3½" apart can be adjusted in one setting of the gage, by simply changing the micrometer support arm from one side of the pedestal to the other. Also, the shorter base permits attachment to a bar on which the space between tools is as little as 2". ***This gage will speed up boring work because it greatly reduces the time necessary to get an accurate setting of the cutting tools.*** As with other models, the base has both flat and vee surfaces so that the Pedestal Micrometer may also be used for a depth gage, a height gage, for inspection, for machine setups, and many other purposes. Three clamps are furnished with the gage, to fit all boring bars from 1" to 5" diameter.

Write for Circular

BARTELT ENGINEERING COMPANY
1218 Partridge Ave. Beloit, Wis.

SHELDON

SHELDON BBU-1240 WQ

Precision Lathe

★ This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate thru a standard 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

★ If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE COMPANY, INC.
4252 N. Knox Ave. Chicago, U. S. A.

Liquid air shrinks parts for insertion in cylinder head

APPLICATION of a furnace heat temperature of 550 degrees F. in one operation, followed by the use of liquid air at 76 degrees below zero in the next one, is speeding cylinder head assembly for Pratt and Whitney engines produced by the Ford Motor Company.

In the first operation, the cylinder heads, after coming from the inspection department, are heated to the 550 degree temperature. After removal from the heating oven, the head is placed on a stand and valve seats, at normal temperature, are inserted. Next the barrel and muff assembly, also at air temperature, are inserted. Contraction of the cylinder head as it cools seals all parts in place.

The cylinder heads then are moved to the next operation, involving liquid air at 76degrees below zero, in which the next parts to be inserted are immersed for several minutes. These parts are the spark plug bushings, intake and exhaust couplings and intake and exhaust valve guide bushings. After these have been inserted, expansion seals them in place. In addition to saving time, these methods assure foolproof cylinder head assembly and salvage because of maladjustment becomes negligible. THE END

2 *Small Parts Clamped in Exact Positions with*
DE-STA-CO *Toggle Clamps*

A difficult arc butt weld job is performed swiftly and accurately through use of two De-Sta-Co Toggle Clamps—the smaller one bolted to the work bar of the larger clamp. Note that because of this unique set-up, there can be no variation in the point of welding. Also that parts can be inserted and withdrawn in minimum time. . . . A simple, inexpensive, time-saving fixture.

For clamping parts in production, use De-Sta-Co Toggle Clamps. . . . Available in all types and sizes. . . . Bulletin No. 43, illustrating many practical uses, sent free on request.

DETROIT STAMPING CO.
Established Over 25 Years
356 Midland Ave • Detroit, Mich.

Fray

RAM TYPE No. 7-B

VERTICAL UNIVERSAL MILLING MACHINE

Write for New Catalogue

Used the world over for jig boring, die and permanent mold work, production operations, etc.

FRAY MACHINE TOOL CO.

505 W. WINDSOR ROAD, GLENDALE, CALIFORNIA

Makers of "All-Angle" Milling Machines & Milling Attachments

with the

SCHERR COMPARITOL

Convenient, Fast, Accurate, Versatile

All uncertainties due to the human factor are eliminated in measuring and in checking with the SCHERR COMPARITOL. Any inspector will get the same reading on a given piece of work. Skilled operators are not required.

The COMPARITOL is ideal for precision inspection of plug gages, cylindrical ground work, screw machine parts and other work. The instrument provides visual readings on a scale graduated to .0001". Range is .004" with .002" plus and .002" minus. Two sizes available—Standard—Range 0 to 6" Price $195.00 Heavy Duty 0 to 8" Price $250.00

Investigate the COMPARITOL. Write for folder today.

ADJUSTABLE SNAP GAGES for production inspection.

WILDER PROJECTOR for comparing by means of shadow image. $250.00

ULTRA CHEK — 34 gage blocks provide standard of measurements. $125.00

MAGNI RAY illuminated magnifier for inspection. $18.50

SPENCER MICROSCOPES for surface finish, imperfections. $142.50

GEORGE SCHERR CO., INC.

132 Lafayette Street New York, N. Y.

How Better Design makes for Better TAPPING

Every item in the Procunier line of tapping equipment has been skillfully designed so as to produce definitely faster, more accurate tapping with less tap breakage!

Procunier Universal Tapping Machines

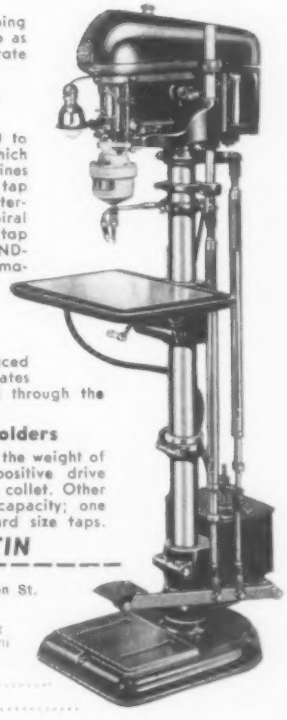
offer: 1. Four speeds, ranging from 390 to 2050 RPM efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to ½" through two interchangeable heads. 3. Extra long Spiral Compensating Springs maintain pre-set tap feeding and reversing pressure INDEPENDENT OF OPERATOR. In addition these machines are so designed that they actually allow the tap to establish its own lead.

Procunier Tapping Heads

Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle.

Procunier Tru-Grip Tap Holders

are the lightest on the market—one-third the weight of conventional tap holders. Tap has positive drive through the squarehole broached in the collet. Other features include: Wide range of tap capacity; one piece body and shank; accepts standard size taps.



SEND FOR BULLETIN

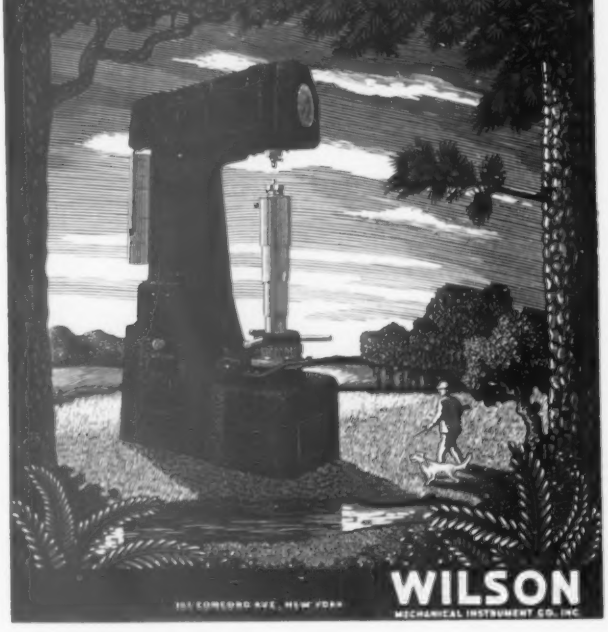
Procunier Safety Chuck Co., 12-18 S. Clinton St. Chicago, Illinois

Send me bulletin on: ☐ Universal Tapping Machines ☐ High Speed Tapping Heads ☐ Tru Grip Tap Holder.

Name .....

Address .....

LIKE HUNTING DOGS WITH THEIR MASTERS OUR "ROCKWELL" HARDNESS TESTERS HAVE GONE AFIELD WITH THE MEN IN METALLURGICAL AND MECHANICAL SEARCHES FOR IMPROVED PROPERTIES IN METALS



WILSON

MECHANICAL INSTRUMENT CO., INC.

Columbia TOOL STEEL

GRADE LABELING—

Customers of this company have always had the benefit of informative grade labels which clearly identify each product.

Our customers are urged to make continued use of this service feature.

It pays to use Good Tool Steel.

COLUMBIA TOOL STEEL COMPANY

ARTHUR T. CLARAGE, PRESIDENT
GENERAL OFFICE AND WORKS
520 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

COLBORNE

Speed Lathes

SPEED UP PRODUCTION

USED FOR FINAL FINISHING OPERATIONS

ECONOMICAL POLISHING LAPPING, BURRING, BURNISHING, FINISHING

OF
GEARS
SHAFTS
DIES
GAGES
BALL RACES
SMALL PARTS
ETC.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has motor in base with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown. Collets or chuck may be used.

GOOD DELIVERY

MACHINERY BUILDERS SINCE 1879

WRITE FOR DETAILS

COLBORNE MFG. CO.

159 W. Division St., Chicago, Ill.

COLBORNE—THE SPEED LATHE PEOPLE

A REALLY Universal Vise!

for Grinding, Drilling and Milling

The DELTA "UNIVISE"

Saves time and assures more accurate work! Rigid and massively built, this first truly universal vise has four component parts. Each part can be independently rotated and set with its separate circular scale of 360°. Thus there are four distinct planes of adjustment—which means that ***any angle*** can be easily and speedily obtained.

The Univise eliminates guess-work and errors even with inexperienced help. For duplicate grinding, the vise can be quickly and accurately returned to any angle by simply making a record of the settings. Settings can be made direct from blue prints. Univise is 5-13/16" high, 6" wide, 7¼" long. Jaws take tools up to 1½". Fits any surface grinder or tool grinder. Has detachable keys on base which can be removed to permit use on drill press or other machines without table slots, or on a magnetic chuck.

DELTA MILWAUKEE

Send Coupon for Full Details

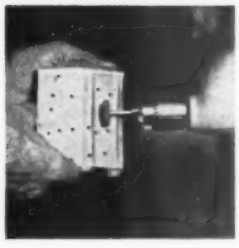
The Delta Manufacturing Company
610-G E. Vienna Ave., Milwaukee, Wis.

Please send me special bulletin on new Delta "Univise".

Name .....
Address .....
City ..... State .....

WELDON ROBERTS

Brightboy

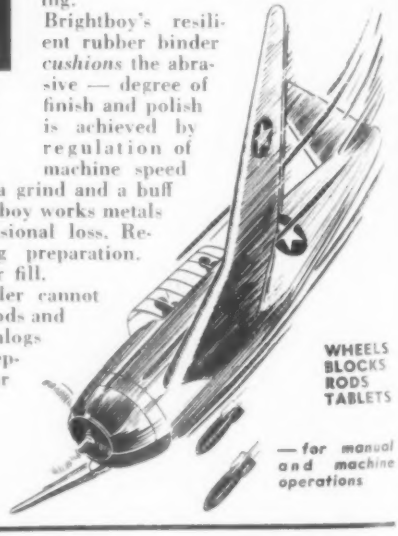


De-burring and finishing holes and edges in Alclad part with Brightboy Wheel.

DE-BURRING *FASTER* Means BOMBING SOONER!

In plane construction and countless other war industries Brightboy saves time and operations in de-burring, cleaning, finishing, polishing.

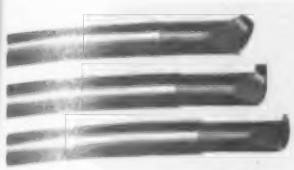
Brightboy's resilient rubber binder *cushions* the abrasive — degree of finish and polish is achieved by regulation of machine speed —operations between a grind and a buff are eliminated. Brightboy works metals with minimum dimensional loss. Requires no time-taking preparation. Does not load, gum or fill. Write us if your dealer cannot supply you with "Methods and Applications" data, catalogs and prices. Our field representatives are at your service.



WHEELS
BLOCKS
RODS
TABLETS

—for manual and machine operations

BRIGHTBOY INDUSTRIAL DIV.
Weldon Roberts Rubber Co.
Newark, N. J.



STYLE A
For general boring

STYLE B
For facing and bottoming

STYLE C
For internal threading

BOKUM TOOLS

Accept More Feed—Increase Production

Since the greatest cutting force is always directed toward its largest cross section, the Bokum Tool can accept more feed than ordinary boring tools; therefore, it completes the job faster.

Original form of tool is never changed through resharpening.

For complete description of these tools send for the catalog that meets your particular needs.

For High Speed Steels, No. A-1139
For Carbide-Tipped, No. A-398

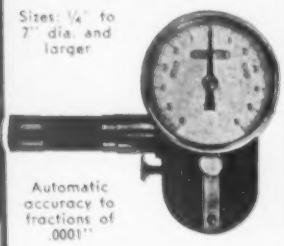
BUY WAR BONDS

BOKUM TOOL CO.
14775 WILDEMERE AVE. · DETROIT 21, MICH.

"This war has certainly taught us a lot about GAGING!"

For precision bores the modern gaging method is to use COMTORPLUG

Sizes: ¼" to 7" dia. and larger



Automatic accuracy to fractions of .0001"

The need to obtain more precise tolerances with less experienced help has led to a wide demand for Comtorplug. Its automatic accuracy — even in the hands of trainees—permits much more precise gaging than limit gages. Furthermore, Comtorplug reveals such inaccuracies as out-of-round, bell mouth, front or back taper, barrel shape, etc., showing the exact dimension of any part of a hole to fractions of .0001"—not a passing reading. Used for bench or laboratory inspection, as well as gaging at the machine.

Request Bulletin 29

THE COMTOR CO.
70 Rumford Avenue
Waltham, Mass.

U S HEADS
STANDARD SINCE 1915

30 DIFFERENT STANDARD SIZE ADJUSTABLE DRILL HEADS, CAPACITIES UP TO 1½" DRILLS

SEND US YOUR B/PS

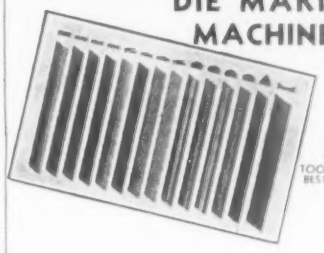
All Types of Fixed Center Heads

UNITED STATES DRILL HEAD CO.
Cincinnati, Ohio

THROUGH ANY STORM WITH

GROB

HIGH GRADE STEEL **FILES** AND DIE MAKING MACHINERY



Grob files are accurate, quality files that remove more stock and cut faster. Get the best—GROB die cutting machines and files.

WRITE OR WIRE FOR DETAILS AND PRICES

GROB BROTHERS
GRAFTON WISCONSIN

GARRISON
GEAR CHUCKS

are used on—

- GEAR SHAPERS
- DRILL PRESSES
- ENGINE LATHES
- TURRET LATHES
- INTERNAL GRINDERS
- EXTERNAL GRINDERS
- OSCILLATING GRINDERS
- DIAMOND BORING MACHINES
- HORIZONTAL BORING MILLS

and are used for—

Grinding . . . Precision Boring . . . Machining and other operations on Spur . . . Internal . . . Bevel . . . Cluster . . . Helical and Herringbone Gears.

GARRISON
MACHINE WORKS, INC.
DAYTON OHIO

THE OLD FEATHER DUSTER

WAS ALL RIGHT IN ITS DAY!

TODAY—INDUSTRY demands TORIT DUST COLLECTORS

High speed production today requires efficient, up-to-the-minute precautionary measures, of which "dust control" is a major factor. Torit Self-Contained Dust Collectors are the answer, as so many plants and factories have found out. There are over 5,000 users of Torit Dust Collectors today. What greater evidence of satisfaction could one ask?

Torits are portable, easy to install, economical to operate. One or more installations oftentimes prove more practical than costly central dust collecting systems. Get the story today . . . Send for your bulletin giving full details.

TORIT MFG. CO.
281 Walnut St. St. Paul, Minn.

TORIT
Dust Collectors
SELF-CONTAINED UNITS

Color Contrast Painting for Machinery Recommended

"Good industrial housekeeping means less personal injury hazard," said R. A. Massey, Du Pont color expert, in pointing out recently that last year enough man-hours were lost on production lines because of accidents to build 9,000 heavy bombers.

Massey spoke before a joint meeting of the American Institute of Electrical Engineers and the Illuminating Engineering Society.

Contrast color: "The best and newest way to promote good housekeeping," he said, "is by a new scientifically developed use of bright paint colors on all industrial interior surfaces, including even floors and machines."

(See THE TOOL ENGINEER, Feb., 1943, Pg. 90.)

The up-to-date trend, he explained, is row upon row of machine tools painted in carnival colors with here and there touches of brilliant red to emphasize danger points.

Many factory interiors already display the new scientific color system. They include government arsenals, naval shore stations and major war plants.

"When the so-called 'Three-Dimensional Seeing' technique, recommending lighter paints than were previously considered practical in industry, was first installed in plants, we half anticipated some grumbling from maintenance men," he said.

"Yet workers take pride in their bright machines and keep them clean. Tools and greasy rags are not so carelessly tossed aside on the floor to add gray hairs to the plant safety engineer. Dark objects on light colored floors are so conspicuous, moreover, as to reduce greatly the slipping and stumbling hazard." THE END.

CLASSIFIED ADVERTISING
THE TOOL ENGINEER
2842 W. Grand Blvd. Detroit, Mich.

SITUATIONS AVAILABLE

CHIEF TOOL ENGINEER WANTED: By a large tool and die company located in the Middle West, with an engineering department employing over 100. Doing 100% war work with excellent opportunities for post-war work. Must have a thorough knowledge of standard and special tooling, jigs, fixtures, gauges, special machinery, and be capable of producing results. State age, education, experience. Also enclose photograph in first letter. Box 774, THE TOOL ENGINEER.

WANTED: TOOL ENGINEER AND DESIGNER. In Middle West plant, builder of machine tools. Need men with experience. Give age, experience, salary, and when available. Box 775, THE TOOL ENGINEER.

PRODUCT WANTED

WANTED

A post-war product to be manufactured by large metal working plant. Patented articles or those having merit will be considered. Box 776, THE TOOL ENGINEER.

BALDOR
BALL BEARING GRINDERS
for accurately sharpening
CARBIDE TOOLS

1-YEAR GUARANTEE

BALDOR CARBIDE TOOL GRINDER is precision-built for accurately and quickly sharpening Carbide Tools. Sturdy ½ H. P. heavy duty, ball-bearing, reversible Motor. Large adjustable tool-rest tables. Satisfaction guaranteed.
NEW LOW PRICE $95.00
WRITE FOR BULLETIN 307
BALDOR ELECTRIC COMPANY
4335 Duncan Ave. St. Louis, Mo.
BUILT BY MOTOR SPECIALISTS

BE SURE and ARC WELD IT with a HOBART

Hobart "Simplified" Arc Welders, with exclusive Remote Control, 1,000 combinations of voltage and current, insure speed and economy. Available on suitable priority.

Get on with your Post-War planning

free

• Special design sheets prepared by well-known welding consultant. No one interested in arc welding should be without them. Initial plates without charge. Ask for them on your letterhead.

HOBART BROS. CO., Box TE-73
TROY, OHIO

HOBART "Simplified" ARC WELDING

• MACHINE DEVELOPMENT

• MACHINE DESIGN & BUILD

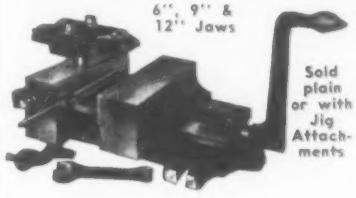
• TOOL DESIGN

Quotations promptly furnished — WIRE or WRITE Today.

PROVEN
DEPENDABLE
SERVICE

Mc GOWAN
ENGINEERING-SERVICE
★486 PAWTUCKET AVE.★
PAWTUCKET - RHODE ISLAND

GRAHAM
MULTI - PURPOSE VISE



In sizes for light drilling to heavy-duty planer and shaper jobs, this vise serves a variety of uses on a variety of machines. Attachments permit use for repeat-operation positioning instead of special jigs or fixtures.

KNURL HOLDER FITTING LATHE TURRET

A pair of straight Knurls produces straight, spiral, or checkered patterns in this any-angle tool handling work up to 2½" dia. Shank to fit your turret.

Request Illustrated Price Circulars

GRAHAM MFG. CO.
79 BRIDGE ST., EAST GREENWICH, R.I.

For
METAL
PLASTIC
WOOD

Industry's New Tool
Mead Burring Machine

It is a time, labor and money saver on innumerable jobs in any shop. De-burs stampings, forgings, castings; finishes and polishes irregular shapes.

MEAD SPECIALTIES CO.
Dept. 33-T
19 S. MARKET ST. CHICAGO, ILL.

Punches and Dies

for
Metal-Cutting
Machines

Standard sizes carried in New York stock in rounds, squares, flats, and ovals

•

Special tools designed to meet your requirements or made to your blueprints.

Catalog No. 8 on request

☆

T. H. LEWTHWAITE MACHINE CO.
307 E. 47 St. NEW YORK

IMMEDIATE DELIVERY

AUTOMATICS
Cleveland, 2½" Model A
Cleveland, ⅞", 1¼", 2 & 2½" Model B
Cleveland, ⅞" 4 Slide Cutoff
Gridley, S.S. 2¼", 3¼" and 4¼"
Potter & Johnston, No. 5A & CA, M.D.
Nos. 22, 23 & 24 New Britain

GRINDERS
No. 6, 15, & 18 Bryant Internal
Landis No. 1 Universal
Landis 10 x 36" Plain, M.D.
14 x 36" Norton Plain, M.D.
Lapper, 26" Bethel-Player

LATHES
American, 14" x 6' Q.C.G.—M.D.
Hendey, 12 & 14" x 6' Q.C.G.—M.D.
Putnam, 60" x 17" with 12" Riser Blocks
Sundstrand Stub, 8" M.D.
J & L 3" x 36" Dble Spindle

MILLING MACHINES
No. 1 & 2 Craftsman Rotary
Ingersoll Rotary, 2 spdle
Becker No. 8 Duplex, M.D.
Becker Vertical, Model C, 30" Rotary Table
Becker Vertical, Model SD, 40" Rotary Table

PLANERS
Hamilton, 36 x 36" x 10' two Rail Heads
Ohio, 42" x 42" x 10' one Head
Bedford 39" x 13'—1 Rail & 1 Side Head

PRESSES
No. 2 to 5 Consolidated O.B.I.
No. 34 Toledo Solid Back, Geared
No. 2, 3, 4 Farracute Solid Back
No. 778 Niagara Dble Crank

MACHINE TOOLS POWER PRESSES
OTT MACHINERY SALES INC.
546 Second Ave. Detroit, Mich.

The "Sterling" mark on reconditioned cutting tools.

We etch it on every piece, and we stand behind it.

NATIONAL TOOL SALVAGE CO.
6511 Epworth Blvd.
Detroit, Michigan
(Note new address)

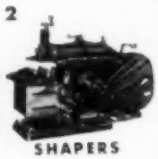
KEEP 'EM FLYING BUY WAR BONDS

Take an Atlas No. 73 Drill Press, add Production Oil Table, Tapping Attachment, Foot Lever Control, and you have a real producer for simplifying and economizing on drilling and tapping jobs.

The Atlas floating-drive spindle design with 4 SKF ball bearings assures smooth running and long accurate service. Write for newest delivery schedules. Atlas Press Co., 714 N. Pitcher St., Kalamazoo, Mich.

Atlas
4 TOOL TEAM
for Small-Part Machining

1 LATHES


2 SHAPERS

3 MILLING MACHINES

4 DRILL PRESSES

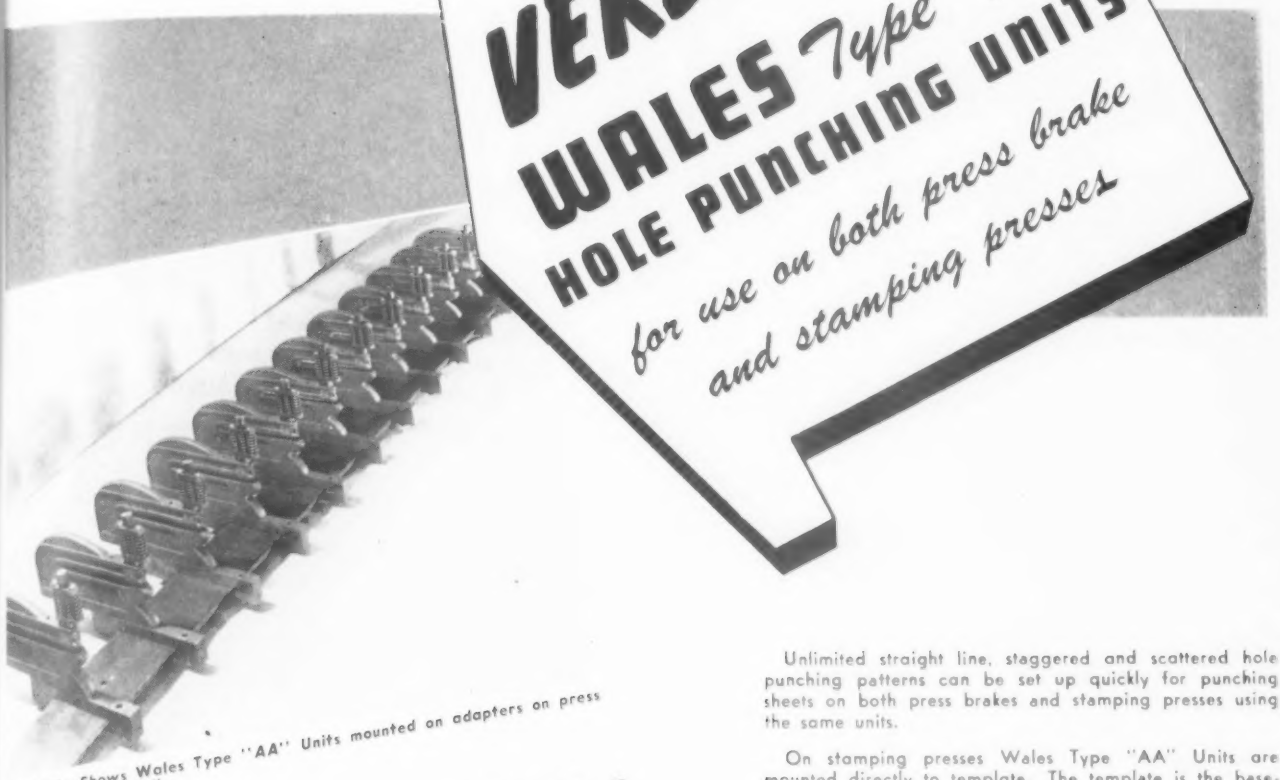
Advertisers Appearing In This Issue

Abrasive Machine Tool Co. 204
Acme Industrial Company 194
Acme Machine Tool Co., The 140
Acro Tool & Die Works 200
Adamant Tool Co. 200
Aero Tool Co. 18
Ajax Steel & Forge Co. 207
Allen Mfg. Co., The 184
Amco Gage Co. 200
American Broach & Machine Co. 173
American Cutter & Engineering Corp. 212
American Photocopy Equipment Co. 215
American Screw Products 147
Ames, B. C., Co. 158
Ampco Metal, Inc. 178
Anderson Bros. Mfg. Co. 124
Apex Machine & Tool Co., The 32
Armstrong-Blum Mfg. Co. 154
Armstrong Bros. Tool Co. 212
Atlas Press Co. 226
Avey Drilling Machine Co., The 138
Baker Bros., Inc. 65
Baldor Electric Co. 224
Barber-Colman Co. 4
Barnes Corp., John S. 156
Barnes Co., W. F. & John 189
Barnes Drill Co. 195
Bartelt Engineering Co. 220
Bay State Abrasive Prod. Co. 139
Blake Company, Edward 185
Blanchard Machine Co., The 51
Boggis & Co., Henry P. 205
Bokum Tool Company 223
Boyar Schultz Corp. 219
Bradford Machine Tool Co., The 176
Brewster-Squires Co. 219
Brown, W. R. Corp. 136
Brown & Sharpe Mfg. Co. 3rd Cover
Bryant Chucking Grinder Co. 43
Bryant Machinery & Engineering Co. 61
Buhr Machine Tool Co. 165
Carboloy Co., Inc. 119
Carborundum Co., The 16
Carlton Machine Tool Co., The 217
Carpenter Steel Co., The 8
Cerro De Pasco Copper Corp. 209
Chambersburg Engineering Co. 157
Chicago Pneumatic Tool Co. 62
Chicago Rawhide Mfg. Co. 213
Chicago Tool & Engineering Co. 213
Chicago Wheel & Mfg. Co. 115
Cincinnati Milling Machine Co., The 120
Cincinnati Shaper Co., The 125
Circular Tool Co., Inc. 195
City Engineering Co., The 13
Cleerman Machine Tool Co. 61
Cleveland Automatic Machine Co., The 9
Cleveland Pneumatic Tool Co., The 56
Cleveland Twist Drill Co., The 29
Colborne Mfg. Co. 222
Columbia Tool Steel Co. 222
Comtor Company, The 223
Cone Automatic Machine Co., Inc., The 104
Cooper-Bessemer Corp., The 122
Copperweld Steel Co. 44
Coulter Machine Co., The James 206
Cozier Machine Tool Co. 213
Cullen-Friestedt Co. 200
Cullman Wheel Co. 207
Cushman Chuck Co., The 192
Dalzen Tool & Mfg. Co. 126
Danly Machine Specialties, Inc. 142
Davis Boring Tool Div. 131
Delta Mfg. Co., The 137, 222
deSanno & Son, Inc., A. P. 60
Despatch Oven Co. 133
Detroit Broach Co., Inc. 96
Detroit Stamping Co. 220
Detroit Tap & Tool Co. 175
Detterbeck Co., Geo. L. 100
Diamond Tool Co., Not Inc. 194
Do-All Co., The 110
Douglas Machinery Co., Inc. 193
Dremel Mfg. Co. 118
Egyptian Lacquer Mfg. Co., The 153
Etco Tool Co. 156
Evans Reamer & Machine Co. 209
Ex-Cell-O Corp. 19
Federal Products Corp. 109
Federal Tool Corp. 205
Firth-Sterling Steel Co. 7
Fray Machine Tool Co. 221
Gairing Tool Co., The 34
Gallmeyer & Livingston Co. 195
Galter Mfg. Co. 146
Gammons-Hoaglund Co., The 217
Garrison Machine Works, Inc. 223
Giddings & Lewis Machine Tool Co. 37
Giern & Anholtt Tool Co. 194
Gilmore Co., F. F. 172
Gisholt Machine Co. 45
Glenzer Co., The J. C. 160
Gorton Machine Co., Geo. 181
Graham Mfg. Co. 225
Grayson Mfg. Co. 145
Greenfield Tap & Die Corp. 68
Greenlee Bros. & Co. 63
Grob Bros. 223
Hammond Machinery Builders, Inc. 146
Hanna Engineering Works 144
Hannifin Mfg. Co. 66
Hardinge Bros., Inc. 35
Hartford Special Machinery Co., The 215
Haskins Co., R. G. 191
Haynes Stellite Co. 55
Heald Machine Co., The 38
Hecker, A. W. 47
Hill Acme Co., The 152
Hobart Bros., Co. 224
Hole Engineering Service 195
Holo-Krome Screw Corp., The 2
Independent Pneumatic Tool Co. 15
Ingersoll Steel & Disc Div. 52
International Nickel Co., Inc., The 59
Jansson Gage Co. 205
Jarvis Co., The Chas. L. 169
Jones & Lamson Machine Co. 6
Kearney & Trecker Prod. Corp. 11
Knight Machinery Co., W. B. 191
La Pointe Machine Tool Co., The 151
LaSalle Designing Co. 134
Leach Machinery Co., H. 214
Le Maire Tool & Mfg. Co. 214
Lewthwaite Machine Co., T. H. 214
Liberty Tool & Gage Works, Inc. 214
Lincoln Park Tool & Gage Co. 214
Lodge & Shipley Machine Tool Co. 214
Logansport Machine, Inc. 214
Lombard Governor Corp. 214
Lovejoy Tool Co., Inc. 214
Macklin Company 214
Madison-Kipp Corp. 214
Master Chrome Service, Inc. 214
Matthews & Co., Jas. H. 214
Mattison Machine Works 214
McCrosky Tool Corp. 214
McGowan Engineering Service 214
McKenna Metals Co. 214
McKinney Tool & Mfg. Co., The 214
Mead Specialties Co. 210, 222
Michigan Tool Co. 214
Micromatic Hone Corp. 214
Midwest Tool & Mfg. Co. 214
Mohr Lino-Saw Co. 214
Monarch Machine Tool Co., The 214
Monarch Steel Co. 214
Morse Tool Co. 214
Morse Twist Drill & Machine Co. 214
Motor Products Deepfreeze Div. 214
Murchey Machine & Tool Co. 214
National Acme Co., The 214
National Broach & Machine Co. 214
National Tool Co., The 214
National Tool Salvage Co. 214
National Twist Drill & Tool Co. 214
New England Carbide Tool Co. 214
Niagara Machine & Tool Works 214
Nielsen, Inc. 214
Ohio Crankshaft Co., The 214
Oil Gear Co., The 214
O. K. Tool Co., The 214
O'Neil-Irwin Mfg. Co. 214
Onsrud Machine Works, Inc. 214
Oster Mfg. Co., The 214
Ott Machinery Sales, Inc. 214
Ozalid Products Div. 214
Pioneer Pump & Mfg. Co. 214
Pipe Machinery Co., The 214
Potter & Johnston Machine Co., The 214
Pratt & Whitney Div. 2nd Cover
Preis Engraving Machine Co., H. P. 214
Procunier Safety Chuck Co. 214
Producto Machine Co., The 214
Putnam Tool Co. 214
Quality Tool & Die Co. 214
Racine Tool & Machine Co. 214
Ransome Machinery Co. 214
Ready Tool Co., The 214
Rehnberg-Jacobson Mfg. Co. 214
Reliance Electric & Engineering Co. 214
Robbins Engineering Co. 214
Roberts Rubber Co., Weldon 214
Ruthman Machinery Co., The 214
Savage Tool Co. 214
Sav-Way Industries 214
Schauer Machine Co. 214
Scherr Co., Geo. 214
Scully-Jones & Co. 4th Cover
Sellers & Co., Inc., Wm. 214
Seneca Falls Machine Co., The 214
Severance Tool Industries Co. 214
Sheffield Corp., The 214
Sheldon Machine Co., Inc. 214
Sidney Machine Tool Co., The 214
Siewek Tool Co. 214
Skilsaw, Inc. 214
Smit & Sons, Inc., J. K. 214
South Bend Lathe Works 214
Standard Gage Co., Inc. 214
Standard Oil Co. (Indiana) 214
Stanley Works, The 214
Starrett Co., The L. S. 214
Stokerunit Corp. 214
Strong, Carlisle & Hammond Co. 214
Stuart Oil Co., Ltd., D. A. 214
Sturdimatic Tool Co. 214
Sturdy Bilt Equipment Co. 214
Sturtevant Co., P. A. 214
Stutson Assoc., Willis (Everede) 214
Sundstrand Machine Tool Co. 214
Sunnen Products Co. 214
Super Tool Co. 214
Sutton Tool Co. 214
Swartz Tool Prod. Co., Inc. 214
Swedish Gage Co. of America 214
Tamms Silica Co. 214
Tannewitz Works, The 214
Thompson & Son Co., The Henry G. 214
Threadwell Tap & Die Co. 214
Timken Roller Bearing Co., The 214
Torit Mfg. Co. 214
Trico Products Corp. 214
Tubing Seal Cap, Inc. 214
Tungsten Alloy Mfg. Co. 214
Tungsten Electric Corp. 214
Tuthill Pump Co. 214
Union Carbide & Carbon Corp. 214
United Chromium, Inc. 214
United Precision Prod. Co. 214
United States Drill Head Co. 214
U. S. Machine Tool Mfg. Corp. 214
U. S. Tool Co., Inc. 214
Universal Engineering Co. 205, 214
Universal Wheel & Abrasive Corp. 214
Vanadium-Alloys Steel Co. Front Cover
Van Norman Machine Tool Co. 214
Vascoloy-Ramet Corp. 214
Vince Corp. 214
Vonnegut Moulder Corp. 214
Wales-Strippit Corp. 214
Warner & Swasey Co. 214
Welding Equipment & Supply Co. 214
Wells Mfg. Corp. 214
Wendt Sonis Co. 214
Wesson Co. 214
Westinghouse Elec. & Mfg. Co. 214
Wheel Trueing Tool Co., Inc. 214
Whistler & Sons, Inc., S. B. 214
Wickman Corp. 214
Willey's Carbide Tool Co. 214
Wilson Mechanical Instrument Co., Inc. 214
Wood & Spencer Co. 214
Ziegler Tool Co., W. M. 214

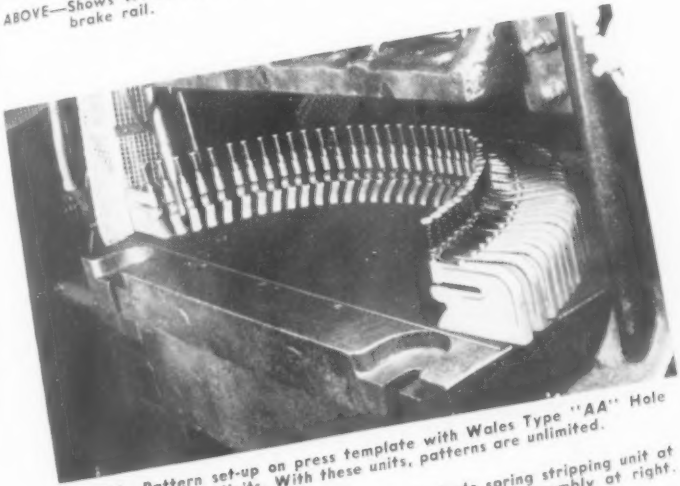
VERSATILE!

WALES Type "AA" HOLE PUNCHING UNITS

for use on both press brake and stamping presses



ABOVE—Shows Wales Type "AA" Units mounted on adapters on press brake rail.



ABOVE—Pattern set-up on press template with Wales Type "AA" Hole Punching Units. With these units, patterns are unlimited.

BELOW—Showing Wales "AA" Units with single spring stripping unit at left and three spring "Selective Stripper" assembly at right.

Unlimited straight line, staggered and scattered hole punching patterns can be set up quickly for punching sheets on both press brakes and stamping presses using the same units.

On stamping presses Wales Type "AA" Units are mounted directly to template. The template is the base-plate and pattern combined.

On press brakes these units are mounted to adapters which are clamped to press brake rail. Two style adapters are available—one "fixed pattern" for straight line patterns and one adjustable front to back for staggered hole punching.

This versatility is made possible by each unit being independent and self-contained with punch and die which are held in constant alignment by a holder. These units are easily moved or replaced in set-up so they can be used and reused to eliminate costly "dead storage."

Other time-saving, money-saving features built into Wales Type "AA" Hole Punching Units:—nothing is attached to press ram . . . punch and die holder is a self-contained unit . . . punch and die are always in perfect alignment eliminating the usual time-consuming adjustments required to line up punches and dies of conventional set-ups . . . interchangeable punches and dies to punch various sizes and shapes with same holders . . . die-setting time and press "down time" are cut from hours to minutes.

"There's Always Something New in the Wales Line."
Keep posted by writing for Catalog AA.

WALES - STRIPPIT CORPORATION

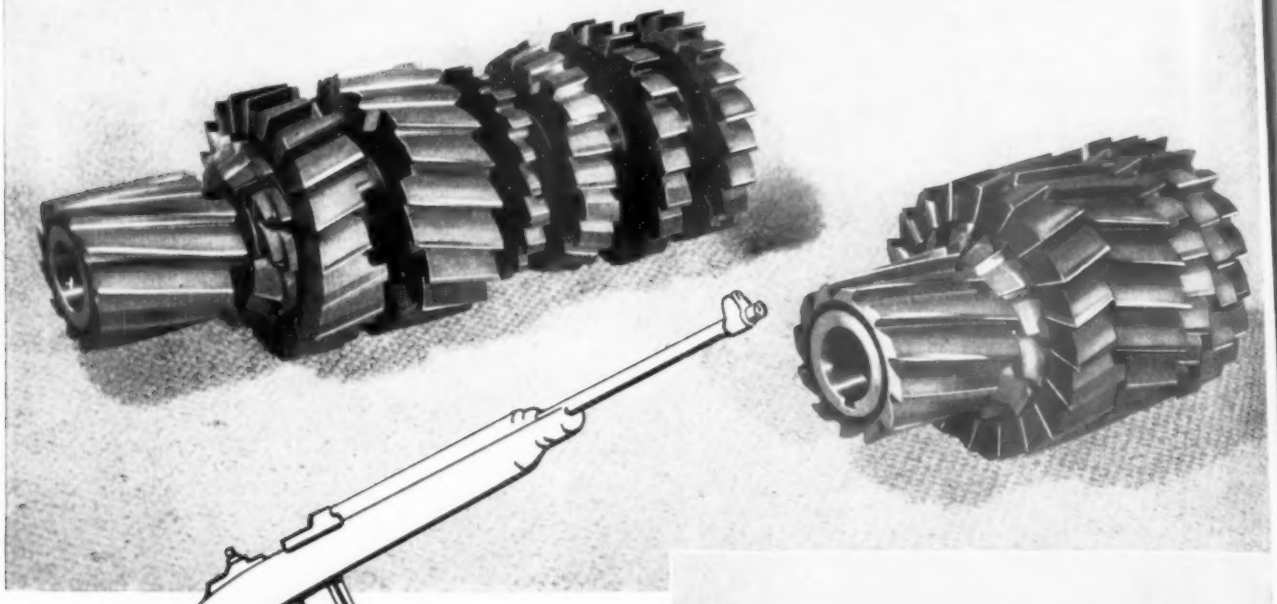
George F. Wales, President

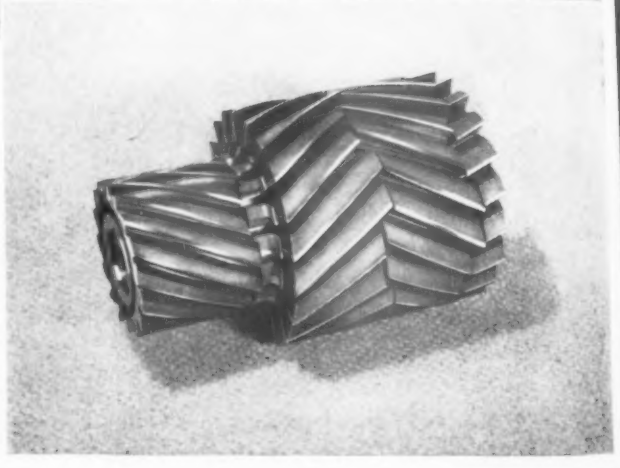
NORTH TONAWANDA, NEW YORK

Specialists in Punching and Notching Equipment

These Morse Tool Company

GANG MILLING CUTTERS





Help to Speed

CARBINE PRODUCTION

Over a period of many years, innumerable types of gang mills and arbors have been manufactured by Morse Tool Company. Typical of these cutters now being used in many armament plants are those which mill the bottom slides of the powerful new carbines used by our armed forces.

Pictured above are the eight cutters which make up the assembly shown to the right and which are used for a finish milling operation. The single illustration shows an assembly of five cutters used for roughing. A number of sets of each of these gang mills are now performing efficiently and accurately in plants where carbine production is at peak volume.

Morse Tool Company manufactures also many types of special milling and form relieved cutters, as well as complete lines of standard high speed tools.

Morse Tool Company 116 E. GOLDENGATE ST. DETROIT • MICHIGAN

PUMPS

FO EVERY INSTALLATION REQUIREMENT —

Fo Lubrication—Supplying Coolant—Ci ulating Purposes—Transfer Work—and for Hydraulic Installations

R tary Geared Pumps are positive in action and can ma tain substantial pressures. Compact Motor Driven types simplify installations.

500 Series Rotary Geared Pumps with herringbone gears operate under pressures up to 500 lbs. per sq. in.

Motor Driven Centrifugal Pumps are suited for supplying coolant containing dirt or abrasives and for light transfer work. Pumps having foot type motors or integral flange mountings are extremely flexible in installation possibilities.

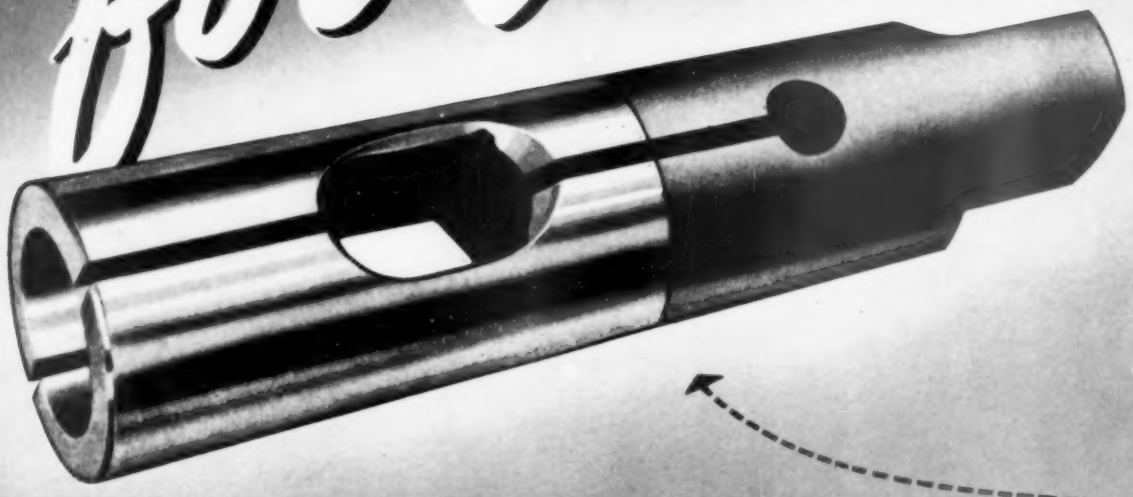
We are proud to be honored with the Navy "E", awarded for outstanding accomplishment in Defense production.
Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

Prompt Deliveries —
on Several Styles and Sizes

Catalog showing complete line of geared, vane and centrifugal pumps including full characteristics, performance charts and engineering data sent on request.

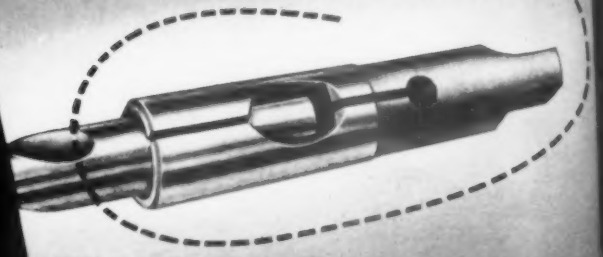
BROWN & SHARPE

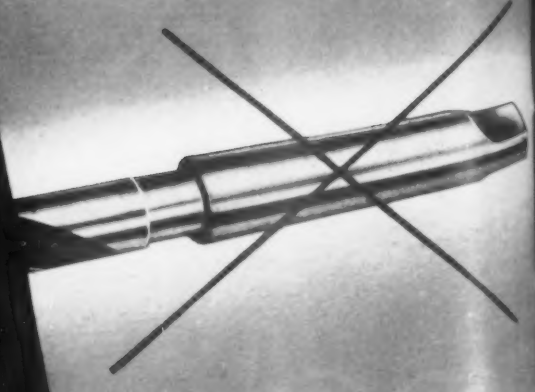
Conserve for Victory



By Using

your straight shank drills in taper hole spindles. The Scully-Jones Style "B" Drill Chuck has a taper shank to fit the spindle and a straight bore to accommodate the straight drill. At the bottom of this hole is a splined section having a width that permits a milled flat on the drill to enter and furnish a positive drive. The inside hole and the taper on the outside are ground concentric, thus assuring a true running drill.





IMMEDIATE DELIVERY

Scully-Jones

AND COMPANY

[illegible] SOUTH [illegible] STREET • CHICAGO, U. S. A.